THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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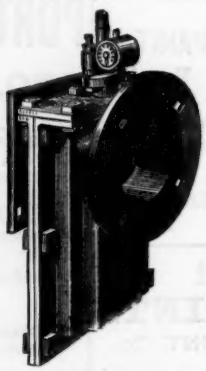

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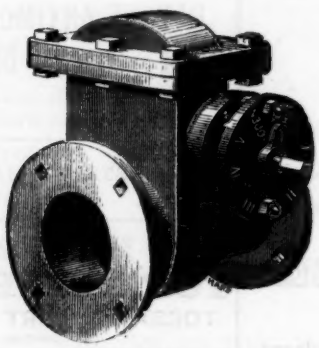

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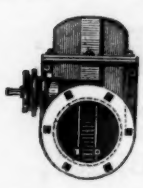

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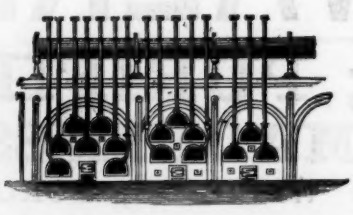

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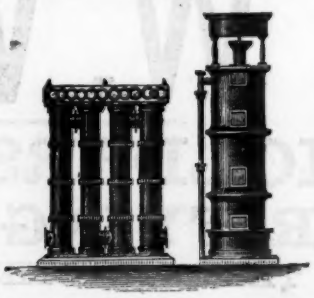

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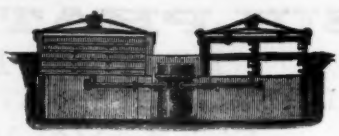

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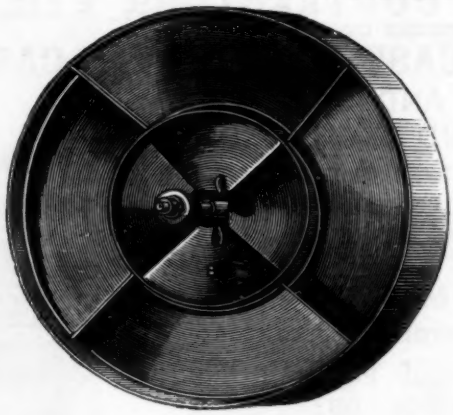

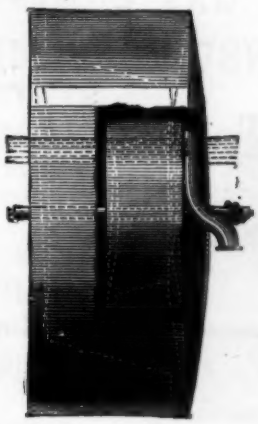

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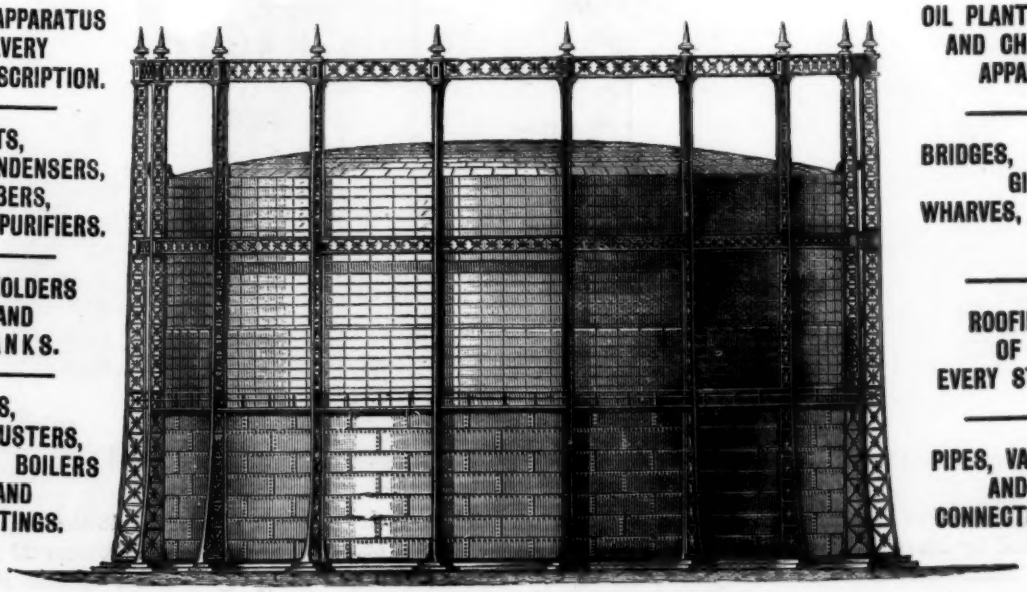

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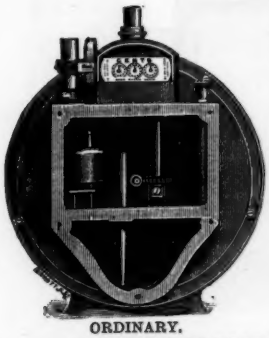

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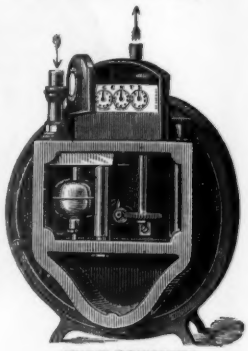

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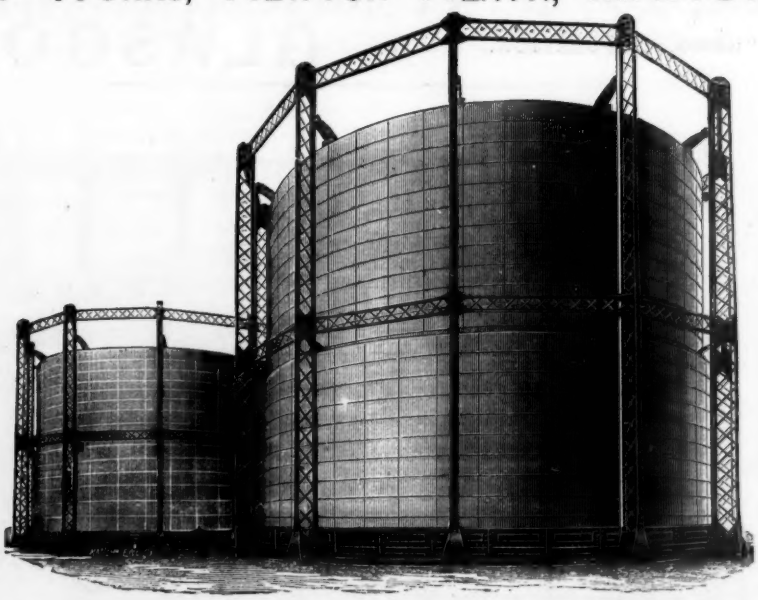

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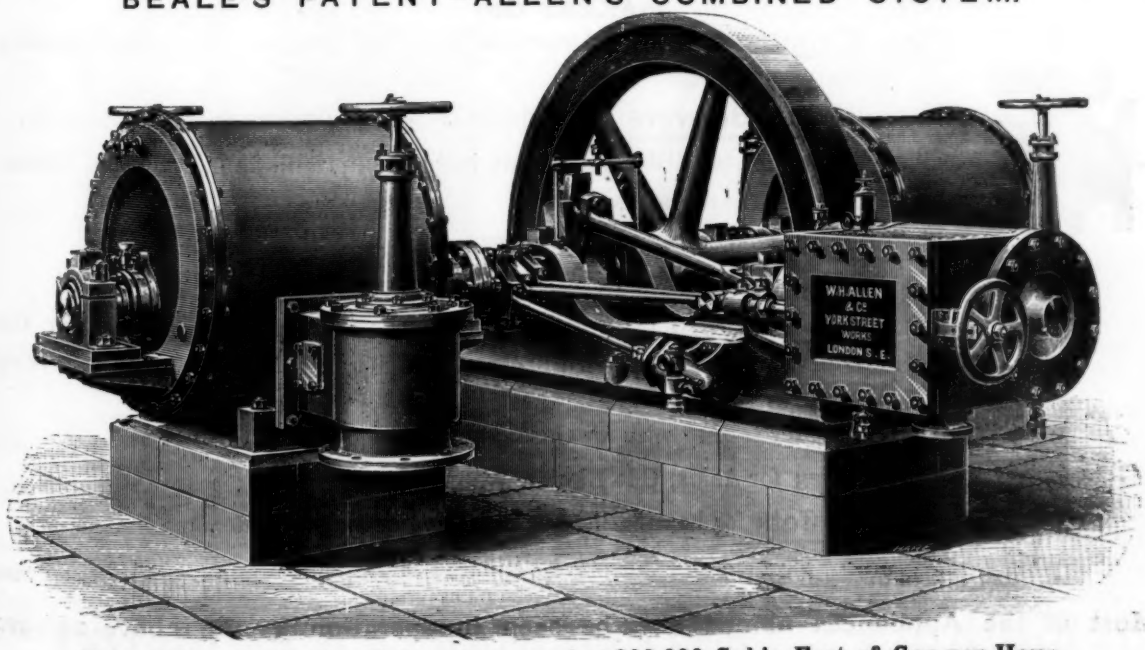

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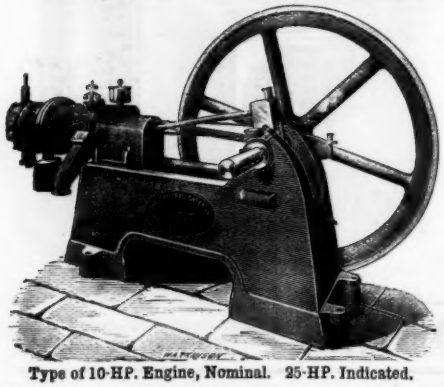

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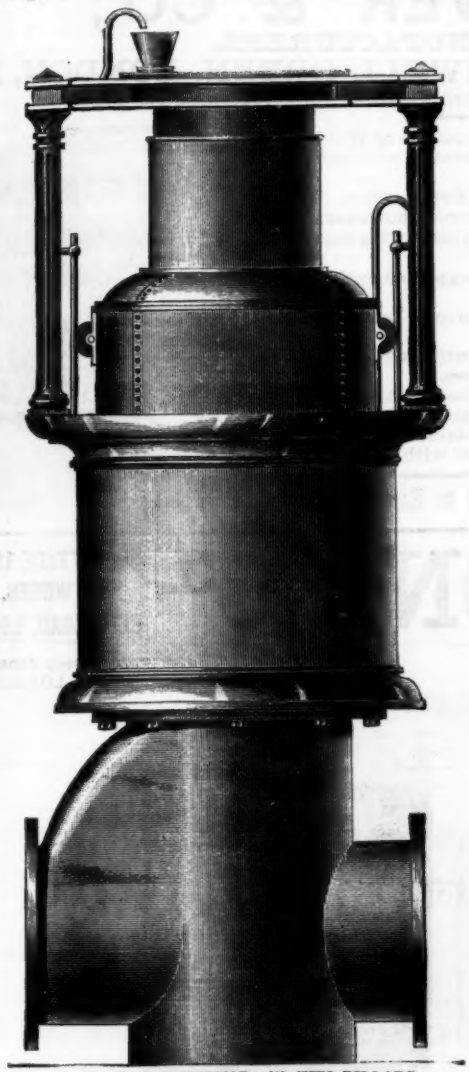

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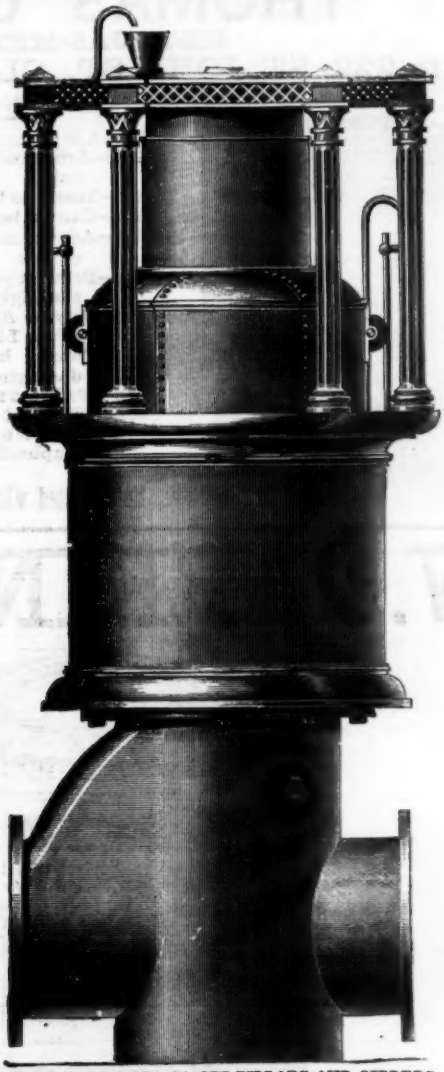

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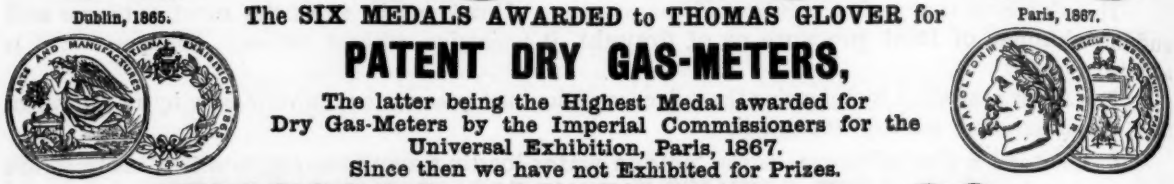

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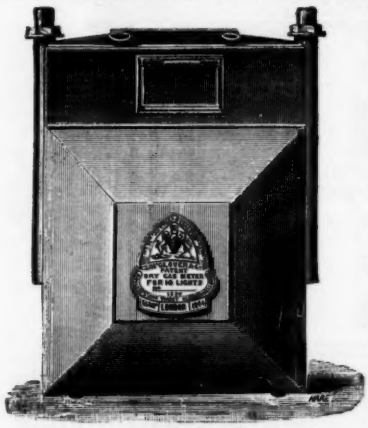

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

THE JOURNAL OF GAS LIGHTING,
WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, APRIL 9, 1889.

THE ACCOUNTS OF THE METROPOLITAN GAS COMPANIES FOR 1888.

In accordance with custom, we publish in another part of the JOURNAL our summary of the accounts of the Metropolitan Gas Companies for the past year, the material for which has just been completed by the appearance of the accounts of the Commercial Company. It will be seen from this statement that £14,224,223 is now employed in lighting London by gas; the increase for the year under this head being £60,851, whereof by far the greater share was taken by the South Metropolitan Company. By the use of this capital, a gross revenue of £4,401,667 was earned, at a cost for expenditure on revenue account of £2,872,642; thus showing a gross profit of £1,529,025. The income of the Companies from all sources shows an increase for the year of £44,112, while their expenses have risen by £52,535; the result being, therefore, to show a decrease of gross profit of £8423. Owing to reduction of price, the amount of money received for gas by the Companies was £91,625 less than for the preceding year; which is our rather paradoxical modern English way of showing that the use of gas is extending, and that the Companies are prospering. In the matter of the residuals, however, there is something very striking to show, for the Companies made £143,802 more in this way last year than they did in 1887. Nobody can account for this. It is a result of market changes which can neither be foreseen nor controlled; and as remarkable as anything about it is the fact that the expansion of value has been confined to tar and coke—ammonia having remained almost stagnant. With regard to expense of working, coals have increased in gross cost, although they have not become sensibly dearer—at least, in these accounts; the increase of £24,090 under this head being referable to the greater weight carbonized. The other aggregate entries do not call for comment.

In the second table, giving the amounts of the accounts reduced to the datum of the work done, as shown in the weight of coal carbonized, there are several points of interest. The capital required to supply London with gas is being better utilized than formerly. It now stands at £5 11s. 2·37d. per ton of coal carbonized. The reduction for the year in the case of the Chartered Company was nearly 3s. per ton, and of the South Metropolitan Company almost the same. The Commercial still come well under their neighbours in this respect; doing their work with only £4 2s. 10·20d. of capital per ton of coal. The Chartered still keep the lead by a considerable length in the amount of revenue they get out of a ton of coal. Last year it was £1 15s. 5·46d.; while the South Metropolitan—the lowest in this regard—made £1 11s. 8·72d. The Commercial did best with residuals; earning 8s. 1·40d. per ton, as against 7s. 10·56d. for the Chartered, and 7s. 9·60d. for the South Metropolitan. Coals cost all the Companies, on an average, 11s. 9·98d. per ton, as against 12s. 0·17d. in 1887. All participated in the reduction. Purifying costs the South Metropolitan Company considerably less than it does the other Companies. The Commercial pay more for salaries and wages for gas manufacture than either the Chartered or the South Metropolitan. In wear and tear, the South Metropolitan show an approach to the Chartered figures—the charges of the two Companies under this head being 2s. 6·91d. and 2s. 7·71d. respectively; whereas the Commercial are only 1s. 11·49d., or less than they paid the year before. The Commercial are favourably circumstanced also in the matter of rents, rates, and taxes; their expenditure being only 11·84d. in this way as compared with 1s. 8·98d. for the Chartered and 1s. 3·10d. for the South Metropolitan. Management, again, is dearer with the Commercial than with either of the other Companies. Directors and Auditors cost them 3·26d. per ton, as against 1·53d. for the South Metropolitan, and 0·80d. for the Chartered; this difference being due, of course, to the different weights of coals handled by the three Companies. Distribution cost the South Metropolitan Company more than their neighbours. Altogether, however, the expenditure of the Companies on revenue account shows a nearer approach to agreement than formerly. The Chartered spent £1 2s. 11·59d.; the Commercial, £1 1s. 9·27d.; and the South Metropolitan, £1 1s. 1·66d. per ton. In all cases the cost of coals was rather more than half the total working expense.

The following tabular statement of the carbonizing work of the three Companies is as interesting as usual:—

TABLE *of the Residuals and Gas made, per Ton of Coals carbonized, by the Metropolitan Companies in the Year* 1888.

Name of Company.	Coke per Ton of Coals, in Bushels.	Breeze per Ton of Coals, in Bushels.	Tar per Ton of Coals, in Gallons.	Ammoniacal Liquor per Ton of Coals, in Gallons.	Gas Made, Cub. Ft. per Ton.
CHARTERED	45·34	3·65*	11·13	31·49	10,472
COMMERCIAL	47·10	3·97	10·28	39·24	10,175
SOUTH METROPOLITAN.	49·61	3·39	10·24	34·39	10,063
Mean per Ton . .	46·45	3·61	10·86	32·75	10,356

* The return of breeze for the six months ending Dec. 31 is given in *tons*. These have been reduced to bushels, on the Company's basis of 50 bushels to the ton.

Having seen what every ton of coal costs the different Companies, and what they make by it, we may now take account of the products of the coal in the retort-house. Every ton of coal carbonized in London last year produced, according

to this statement, 10,356 cubic feet of gas, 46·45 bushels of coke, 3·61 bushels of breeze, 10·86 gallons of tar, and 32·75 gallons of ammoniacal liquor of the standard strength. The returns for 1887 worked out to 10,320 cubic feet of gas, 45·32 bushels of coke, 4·46 bushels of breeze, 10·71 gallons of tar, and 32·46 gallons of ammoniacal liquor. There has thus been an apparent increase of the yield of gas, and in all the other products. The lead in the make of gas per ton of coal remains with the Chartered; but there is very little real change in the work of the different Companies. The Chartered still claim less coke per ton of coal than either of the other Companies; but they make more tar. The Commercial show best in the matter of ammoniacal liquor. On the whole, however, the working of the Companies from year to year is remarkably uniform, which we take to mean that their carbonizing practice is pretty well settled. They may be waiting for Mr. Dinsmore, or somebody else, to show them how to do their work better; but one cannot help thinking these returns represent the accumulated experience of years of trial and effort, and will therefore be hard to beat.

It is as difficult to say anything novel about the statistics of London gas making as it is to alter them by a new departure. We do not set them up as anything very remarkable, except in respect of the vast scale on which the operations thus exemplified are carried on. A financial system as complex as that of a kingdom, and an army of disciplined workers, are required for the carrying out of this great Metropolitan industry; and the method by which these results are achieved is one of the triumphs of an era signalized by gigantic combinations—social, military, and industrial. It is quite within the bounds of possibility that the working of the Companies does not represent the very best that might be done with the raw material consumed; but, on the other hand, it is at least as good a result as can be shown anywhere. One cannot glance over these figures without agreeing that the London County Council showed a wise discretion the other day, when they decided to leave the gas supply of the Metropolis alone. Whatever may be the shortcomings of the legislative system under which this enormous industry has attained to its present bulk, he would be a bold man who should think himself able to propound offhand an alteration that could be warranted to render, by automatic action, the gas supply of London cheaper, better, and generally more satisfactory than it has come to be as the result of the operation of existing influences working through generations of growth and development.

THE COMMERCIAL COMPANY'S MEETING.

The ordinary general meeting of the Commercial Gas Company, held on Friday last, was of an unusually interesting character. There was a good deal of speaking; and the speeches were of a distinctly higher order than those which commonly consume the time of gas shareholders when they meet together under similar circumstances. In the first place, of course, suitable expression was given to the loss sustained by the Company in the death of Mr. R. Bradshaw. In Mr. T. W. Ratcliff, however, the Company have a chief who will not fail to continue the traditions of the chair, and to take care that the interests of the proprietors are safeguarded in the future as they have been in the past. The fact that the new *régime* is inaugurated by a reduction in the price of gas and an increased dividend, is a good augury for Mr. Ratcliff's administration. The great prosperity of the Company during the past half year, mentioned by us last week, was properly acknowledged by the official speakers at the meeting; but no explanation was tendered for the phenomenal increase in the consumption of gas in the district. The most interesting matters discussed at the meeting, from the point of view of the public, were the prospects of electric lighting and water gas. The former subject was introduced by Sir Robert Rawlinson in a clear and well-reasoned speech; and the latter arose natually out of the reflection that must have been present to the minds of the majority of those present, that during the early part of the week a considerable sum of money had been publicly subscribed upon the invitation of the Water Gas Syndicate. It is seldom that much good is done by discussing electricity in a meeting of gas shareholders; but when the example of what electricians are doing is only used as an incentive to reductions in the price of gas, and to endeavours in the direction of popularizing its use, there can be no harm in mentioning the subject. As to water gas, a little curiosity was to have been expected, especially in view of the mystification of the public by the newspapers, which, as we remarked last week, gave it to be understood that Mr. Samson Fox is the first to apply the product successfully in the arts. Both Mr. Livesey and Mr. H. E. Jones, the Company's Engineer and General Manager, did something to straighten out this subject and present the truth respecting it to their hearers. Altogether the proprietors who attended the meeting must have felt that the hour which it occupied was well spent in listening to facts relating to coal gas, electricity, and water gas, which go a long way to correct the fallacies that constitute the ordinary staple of newspaper information on these subjects.

GAS EXAMINATION.

The question of photometry is not likely to fail in interest for gas engineers while such proceedings as those which will be found reported in another column—when The Gaslight and Coke Company were fined for slight deficiencies of illuminating power—are undertaken at the instance of Local Authorities. It is a remarkable thing how these prosecutions and fines have thickened of late. For years they were unheard of in London; but latterly there has been a stirring at headquarters, and apparently the word has gone forth that the verdicts of the erratic candle must be acted upon at all hazards. It is known that any agitation that should result in forcing the adoption of pentane as the standard of light in place of the candle would be welcomed in a certain quarter; but in view of what we have stated respecting the disinclination of the Board of Trade to move in the matter, it seems a pity that so much useless fuss should be made by the testing authorities. Magistrate after magistrate has this matter brought before him, only to hear from the defendant Gas Companies the same incontrovertible statements respecting the unreliability of the standard by which gas is tested. Every time this has happened the Court has carried out the law by fining the defendants, but shown the right of the matter by cutting down the fines to nominal amounts. In the last instance, heard by Mr. De Rutzen, the Marylebone Stipendiary, the case was adjourned in order that the Magistrate might consider whether he could dismiss it as a "frivolous prosecution." What the end will be if this policy is persisted in, nobody can say. The Gas Companies will protest and pay, while no real good will be done to anybody by the strained applications of a discredited law. It remains to be seen whether any change will be wrought by the new Instructions of the Referees, mentioned last week. With reference to this matter, the communication from Messrs. Bedford and Monier-Williams, the Solicitors for The Gaslight and Coke Company, who have acted for the Company throughout these testing troubles, will be read with interest. The Company are not at all disposed to accept quietly the bad reports of their gas which the Examiners may send in from time to time. There is an appeal in such cases to the Chief Gas Examiner, who has been in the habit of requiring a statement in writing from both sides, upon which he has given his decision; and the fine by the Magistrate, who is merely an executive officer in these matters, has followed as a matter of course when the judgment has been against the Company. Some little time ago, however, The Gaslight and Coke Company insisted upon the Chief Gas Examiner's holding a court for the *viva voce* hearing of a case of this kind, which was attended by the Gas Referees and all the other interested parties. This hearing, we believe, was the first and only one of the kind that has been held since the passing of the Act. One of its results is, as now appears, the alteration of the Referees' Instructions. With regard to the greater part of Messrs. Bedford and Monier-Williams's letter we have nothing to say. Their comment upon the new order for not rejecting any test because it appears to be improbable, puts the matter in an entirely new light. As to our overlooking the legal prescription of the time to be devoted to testing gas in London, we can only plead that we represented the practice of the matter. It is curious that the direction to allow intervals of an hour between tests was omitted from the old Instructions; and we have no hesitation in stating that the Gas Examiners have been in the habit of ignoring it also. They at least would be the first, if they dared to speak, to support our statement that their hours of work are doubled by the new orders. Mr. Magnus Ohren's letter, referring to our article of last week, in which we propounded the query whether photometry is to be regarded as discredited as a method for ascertaining the illuminating value of gas, may also be mentioned here. It is suggested that instant experiment should be made in the Metropolitan gas-testing stations with a view to settle the value of specific gravity determinations as indications of the luminous value of coal

gas. The idea is at least feasible, seeing the deadlock which threatens gas examination as by law established.

THE END OF THE SALTLEY AGITATION.

The agitation respecting the management of the Saltley Gas-Works of the Birmingham Corporation has terminated in the adoption by the Town Council of the report of the Gas Committee exonerating Mr. Hack, the Engineer, from the charges preferred against him by the so-called "labour representatives" in the Council; and Mr. Hack's request for an increase of salary, which was the occasion for the raising of the allegations against his character as a manager of workmen, has been granted. The subject was thoroughly gone into by the Council on the presentation of the report in question; and not only this statement was discussed, but also some curious comments upon it by which the councilmen who started the agitation sought to counteract the effect which it was so evidently calculated to produce. This composition is a study in the art of making mountains out of molehills; and we make bold to say that no factory could be carried on where outsiders not responsible for the results were allowed to interfere between masters and men, and raise questions upon such trivial points as form the bulk of Messrs. Bloor and Granger's indictment of Mr. Hack and his assistants. Alderman Pollack, as will be seen from the report of the Town Council proceedings given in another column, went *seriatim* through the counts of this accusation; and the net result of his examination cannot leave in any impartial mind a doubt as to the facts. Where there are upwards of 600 hands employed in a gas-works, it is inevitable that some should think themselves hardly treated occasionally, and that mistakes in the control should sometimes occur. It is quite possible, however, that the very men who commonly make the most noise in public about grievances of this kind would show up in a worse light if a confidential "fishing" investigation were directed into their own personal relations with people over whom they exercise a sort of government. Of course, any number of blacks do not make one white; and if Mr. Hack or his subordinates had, as a rule, been demonstrably harsh in the discharge of their duty to the Gas Committee, they should be censured for it, and cautioned in respect of the future. Judged by any fair standard, their justification has been most complete. It appears, however, that the officers of a Corporation gas-works must not only be fair specimens of humanity, but they must even be positively seraphic. Whatever may be their claims to sanctity, there will yet never be lacking some member of the Town Council to play the part of *avocatus diaboli*, on the strength of some underground accusation which in an ordinary commercial establishment would be treated as it deserved. Let a gas manager for a Corporation be never so able, upright, and devoted, every possible encouragement is given to the first "corner man" who thinks fit to malign him. We shall never excuse patent venality or cruelty in a gas manager; but we hope to continue to observe the good English rule of holding a man to be innocent until he is proved to be guilty, and shall expect to be told that the utility of the Journal is gone so soon as we fall into an imitation of the French judicial practice of treating an accused man as a criminal, to be brow-beaten into a confession of guilt, or kept under suspicion indefinitely, in the hope that something bad may be found against him by persistent subterranean inquisition.

THE WEST HAM BILL—A PRECEDENT.

The most important of the Private Bills relating to gas for the present parliamentary session, is that of the West Ham Company, which passed the Commons Committee on Thursday. It was originally contemplated to take powers for amalgamating the undertaking of the Company with that of some one or other of its neighbours; but the idea was abandoned before the Bill was deposited. The measure was not very strongly opposed for a Metropolitan District Gas Bill; but it only passed through Committee with some very significant alterations. The new capital, of which £250,000 is allowed, is to be raised as 7 per cent. instead of 10 per cent. capital, as asked for; and the borrowing powers are limited to one-fourth in place of one-third. The initial price is cut down to 3s. per 1000 cubic feet; or 3d. less than was required. A remarkable precedent is added to the Bill, to the effect that the Company shall never carry forward out of the profits of any half year a larger sum than the equivalent of ½ per cent. upon the dividend-earning stock. This is the legislative consequence of the judgment in the Ashton case; and it is evidently designed to make the use of the sliding scale compulsory, and to put a stop to the piling up of huge undivided balances. It will be remembered that although the Legislature was very solicitous to limit the amount of Gas Companies' reserve funds, nothing has been said before now as to the permissible amount of money that might be carried on from one working period to another. If there is any but the narrowest meaning to the introduction of this limiting clause into the West Ham Bill, it must be that this oversight is at last to be corrected. It is unnecessary for the moment to discuss the question whether the limitation of the balance forward to ½ per cent. on the stock is a fair one or not. It certainly does not err on the side of liberality; and many gas administrators who may agree with the principle, would feel at liberty to argue that a little more rope should be allowed as a general rule. This is a point for after-consideration, however; the main fact for present remark being that for the first time Parliament has interfered to prescribe a limitation to the sum which a Gas Company may carry forward from one account to another as undivided profit.

The Sanitary Institute.—The next congress and exhibition of the Institute will be held in Worcester, at the end of September.

Private Bill Legislation.—The Bill introduced by Mr. Craig-Sellar for the amendment of Private Bill Legislation, on the lines laid down by the Joint Committee of last session, was issued last week, and stands for second reading on the 30th inst. The introducer asked the First Lord of the Treasury last Wednesday whether he would then be able to afford facilities for the discussion of the measure. Mr. Smith, while admitting the importance of the subject, declined to enter into any engagement on the matter. Sir J. Pease pointed out that there was only a small majority of the Committee in favour of the principle of the Bill; and he has accordingly given notice to move its rejection on the second reading.

Welded *v.* Riveted Water-Mains.—Messrs. Thomas Piggott and Co., of Spring Hill, Birmingham, have just secured an order for about 1200 tons of their patent wrought-iron welded water-mains for the conduit of water for a new water-works in South America. The length of this pipe line is 11½ miles, and 14 inches in diameter is the size required; but each 14-inch pipe can be nested with others of very slightly larger diameter, to as to make the whole nest ship at weight and not measurement. It is interesting to notice that welded pipes, freight included, came out in this case much cheaper than riveted pipes, owing to it being possible, as there are no projecting rivet-heads, to nest them more closely. The competition, therefore, was with cast-iron pipes at about the same price per foot run; but a saving of nearly 3000 tons in weight, made in transport alone an economy of some £9000. Besides this there would only be about one-half the number of joints to make. These considerations practically and speedily decided the matter in favour of the newer system.

The Railway Rates for Coal.—Two notices were upon the House of Commons paper for last night in reference to this subject. Mr. Caine notified his intention of asking the President of the Board of Trade if the Railway Companies of the United Kingdom had all furnished the information required by the rule of the Board of Trade—viz., that they should "state as far as practicable the existing terminal charges in respect of the several classes of traffic, showing in each case the authority for making the charge;" and, if they had done so, where the information was to be found. Mr. Bartley was to ask Sir Michael Hicks-Beach whether representations had reached him that, under the proposed scale of charges of the Great Western Railway, under the Railway and Canal Traffic Act of 1888, the maximum charges, as compared with existing rates, for Class A—cannel, cinders, coal, coke, and culm—would be increased, on a distance of 10 miles, from 11d. to 3s., and on all distances up to 150 miles, though on a decreasing ratio, but making an average increase of 77·8 per cent.; and whether he would submit the proposed charges of the Railway Companies to a Committee of Experts before any Provisional Order for sanctioning such rates was made.

Lighthouse Illuminants.—We learn that there is a prospect of the inquiry in reference to lighthouse illuminants being re-opened, with a view to a final settlement of the question at issue. The report on the South Foreland experiments of 1885, it may be remembered, failed to achieve that result. The most recently issued parliamentary papers on the subject include memorials to the Prime Minister from the leading shipowners at the various ports on the Clyde, the Tyne, and the Mersey, as well as at Dublin and Belfast, all expressing dissatisfaction with the South Foreland report. They propose that one of two courses should be adopted—either that a Royal Commission should be appointed to carry out further experiments in lighthouse illuminants; or that the criticisms of the recent report should be submitted to the judgment of independent scientific experts. As the result of an interview which Sir Michael Hicks-Beach lately granted to Mr. J. R. Wigham—whose system of gas illumination, it will be remembered, figured conspicuously in the South Foreland experiments—arrangements have, we believe, been made for the appointment of a Committee, consisting of the President (Professor Stokes) and two Fellows of the Royal Society, to deal with the whole matter.

Water and Sanitary Affairs.

An interesting and important feature in the proceedings at the half-yearly meeting of the East London Water-Works Company last week was the reference made to the extension of the water supply itself. The development of the supply from the works of the East London Company is a matter of peculiar moment; seeing that from this source a larger number of consumers are supplied than appertain to any other Company—the volume of water so distributed amounting to more than 20 per cent. of the total sent out by the entire eight Metropolitan Companies. As mentioned by the Chairman, Mr. A. W. Gadesden, at the meeting last week, considerable anxiety has been expressed by General Scott at the probability of the water supply of the Metropolis running short, especially in the north and north-east. In his last annual report to the Local Government Board, General Scott remarked that "any recurrence at present "of such a falling off in the flow of the Lea as was "recorded in 1874, would probably result in serious "inconvenience to the population supplied by the East "London Company." The Chairman states that anxiety was also felt on this subject by his Directors, and for this reason they proceeded to sink certain wells in the Lea Valley. To these wells—three in number—General Scott makes allusion in his report; speaking of them as being in progress at Lea Bridge, Walthamstow, and Waltham Abbey. The well at the last-named place is now in working order; and the particulars concerning it given by the Chairman are highly satisfactory. If the other two wells prove equally successful, it is expected that the increasing wants of the Company will be met for at least ten years to come. In the confidence that this will be the case, the apprehensions expressed by General Scott are considered to be fully met and disposed of. Perhaps General Scott will scarcely admit so much; but he will certainly allow that the situation is improved. The New River Company are concerned in this matter as well as the East London. General Scott calculates that if both these Companies rely on their well supply to meet future requirements, and to make up for the deficiency of the Lea during seasons of scanty rainfall, the Sunbury intake being kept to its present limit, they must anticipate that by 1892 they will be in a position to derive from the basin of the Lea, by means of wells, as much as 29 million gallons daily—the New River Company taking 17 millions, and the East London 12. Doubt is expressed whether so much can be safely reckoned on, should it be wanted. If obtained, then follows a question as to whether the springs feeding the River Lea will suffer from this depletion.

General Scott fears that too sanguine a view may be taken of the capabilities of the chalk in the basin for supplementing the volume of water now derivable from the river. Nevertheless, he admits that the project now in hand, which includes tunnelling in addition to well-sinking and boring, "is one which must be highly commended." The extraordinary growth of the population in London and its suburbs creates the difficulty in this as in other cases. The Water Companies extending into the "Outer Ring" are particularly affected by it. The water from the Waltham Abbey well is pumped up to an elevated reservoir at High Beech, whence it is distributed by gravitation to a number of outlying places. The supply is said to be "most abundant," as well as excellent in quality; the latter recommendation being assured by the fact that the water comes from the chalk. Concerning the utmost available quantity, we must wait for further experience. The yield to be obtained from the well now in course of construction at Lea Bridge, as also from the one at Walthamstow, has yet to be ascertained; and by-and-bye we shall know something more as to the effect of pumping in lowering the level of the surface of saturation. The prospect of being safe for ten years is something; and from the anticipations of Mr. Bryan, the Company's Engineer, it appears that a yet longer period may be reckoned upon. With all the necessary outlay for these extensions, it is satisfactory to find that the Company are able at the same time to enlarge their dividend. With Mr. Tendron, we may question whether, if the County Council acquired the undertakings of the Water Companies and consolidated them, the public would be better served, or any appreciable economy secured.

At last Tuesday's meeting of the Institution of Civil Engineers, Mr. W. J. Carpenter, Superintendent of the Great Yarmouth Gas-Works, was elected an associate member.

Essays, Commentaries, and Reviews.

THE AFFAIRS OF THE GAS INSTITUTE.

Through the courtesy of Mr. W. Longworth, Hon. Sec. *pro tem.* of The Gas Institute, we have received a copy of the circular to members showing the existing rules, with the amendments and new rules proposed by the Council, and giving the terms of the resolution by which the Council propose to deal with the question of the trading members. We understand that this circular has been distributed among the members generally, and consequently gives the last words of the Council upon the matters embraced in it. We shall not attempt to discuss it to-day, as it has only just come to hand; and we think it better, therefore, to reproduce the proposals of the Council *verbatim*, without comment. In the circular, the old and new rules are printed in parallel columns, for facility of comparison; but we cannot afford space for this, and our readers must therefore make their comparisons by the aid of a copy of the existing rules. Broadly speaking, the alterations and additions bear out the already known policy of the Council in respect of the remodelling of the governing body of the Institute; the adjustment of the regulations relating to voting in accordance with legal requirements; and the relegation of trading members to the class of "Associate Members," or "Associates." It is necessary to point out, however, that this latter proposal stands on a totally different footing from that of the rest of the propositions of the Council. Revision of their own rules is a business which all societies are competent to undertake; but a measure for disfranchising any member or class of members is revolutionary. We cannot help expressing regret that the Council have not taken any notice of the feeling that the rumour of their intentions in this regard inspired, so far at least as to justify their proposed resolution by a legal opinion. In default of this, there is no guarantee that in accepting it the members will not plunge the Institute into greater difficulties than any from which it is put forward as the means of deliverance.

Proposed Amendments and New Rules.

1. Rule to remain.

2. The Institute shall consist of Members, Associate Members, Associates, and Honorary Members.

3. Members shall be either Engineers, Managers, or Secretaries of gas undertakings; the latter being exclusively employed as such, and Gas Engineers solely employed as Consulting Engineers, and not engaged as principals or agents for any trading or manufacturing firm.

4. Rule to remain.

NEW RULE 4*a*. In the event of any Member or Associate Member ceasing to hold the necessary qualification as above described, his membership shall immediately cease; but his name may be placed by the Council in the class of Associates.

5. Rule to remain.

6. Honorary Members shall be persons who take an interest in matters connected with Gas Engineering, or whose scientific or practical knowledge recommends them to the Institute; but the number shall not exceed twenty-five.

7. Rule to remain.

8. The Council shall consist of a President, three Vice-Presidents, twelve Ordinary Members, and an Honorary Secretary. Each Past-President shall also be *ex officio* a member of the Council for the period of one year from the date of his retirement from the office of President. Five to form a quorum.

9. The Office-Bearers shall consist of the Council as aforesaid, three Trustees, a Secretary, and two Auditors.

10. Rule to be struck out.

11. Rule to remain.

12. Rule to remain.

13. The Secretary shall, subject to the control and under the direction of the Hon. Secretary, receive all moneys, except such as are specified in Rule 18, and pay the same to the banking account of the Institute. He shall take minutes of the proceedings at all meetings of the Institute, and enter them in proper books provided for the purpose. He shall conduct the correspondence, read minutes and notices at all the meetings, and also papers and communications if desired; report discussions, and perform whatever other duties may be indicated in the rules of the Institute as appertaining to his department.

14. Rule to remain.

15. The Council shall forthwith, after the Annual General Meeting in each year, appoint a Finance Committee, consisting of three members of the Council. The Finance Committee shall meet periodically to receive from the Honorary Secretary a statement of accounts, and make all payments by cheque, signed by at least two members of such Committee, and countersigned by the Hon. Secretary. All accounts must be sanctioned by the Council; but the Finance Committee shall have power in the meantime to pay accounts not exceeding £10 in amount.

16. All the property of the Institute, except such as shall be from time to time in the hands of the Council, shall be invested in the names of the Trustees. Any vacancy in their office shall be filled up at an Extraordinary General Meeting, and the remaining Trustees shall thereupon transfer all property and funds into the names of themselves and the new Trustee. In the event of there being a vacancy in the office of all the Trustees at the same time, the retiring Trustees, or such of them as shall survive and be capable of acting, shall transfer the property and funds into the names of their successors when appointed. It shall be competent for an Extraordinary General Meeting to revoke the appointment of any Trustee, and to appoint a new Trustee to supply the vacancy.

NEW RULE 16*a*. The Trustees may invest the funds of the Institute from time to time standing in their names, in any of the public stocks or funds or Government securities of the United Kingdom or India, or any colony or dependency of the United Kingdom, or upon freehold, copyhold, leasehold, or chattel real securities in England, or in or upon the stocks, funds, shares, debentures, debenture stock, mortgages, or securities of any corporation, company, or public body, municipal, commercial, or otherwise, in the United Kingdom or India, or any colony or dependency of the United Kingdom (but not in any other mode of investment); and may, with such consent or at such discretion as aforesaid, from time to time vary or transpose such stocks, funds, shares, and securities into or for others of any nature hereby authorized.

17. Rule to remain.

18. Rule to remain.

19. The Auditors, who shall be members of the Institute, shall examine and certify the accounts, such accounts to be made up to the 31st of December in each year. The Auditors may engage professional assistance at the expense of the Institute if they think fit.

20. Rule to remain.

21. Admission to the Institute shall be by ballot, and shall be conducted as follows:—A list of the candidates who shall have been approved by the Council, stating their qualifications, shall be sent to each Member of the Institute entitled to vote, at least fourteen days before the Annual General Meeting. Every such member may erase from the list the name of any candidate that he objects to, and return such corrected list in a sealed envelope to the Secretary, who shall deposit the same in the ballot-box unopened. The ballot-box shall be opened by the Scrutineers appointed at the meeting; and when the scrutiny is completed, or as soon after as may be convenient, the names of the successful candidates shall be announced. The proportion of votes for deciding the election of any such candidate shall be at least two-thirds of the members who shall be entitled to vote, and shall vote at such election.

22. Rule to remain.

23. Honorary Members shall be proposed by the Council at a General Meeting of the Institute, and shall be admitted on the approval of two-thirds of the members present who shall be entitled to vote, and shall vote at such election.

24. Rule to remain.

25. In case the expulsion of any Member, Associate Member, Associate, or Honorary Member, shall be judged expedient by twenty members, and they think fit to draw up and sign a proposal requiring such expulsion, the same being delivered to the Secretary, shall be by him laid before the Council for consideration. If the Council, after due inquiry, do not find reason to concur in the proposal, no entry thereof shall be made in any minutes, nor shall any public discussion thereon be permitted; but if the Council do find good reason for the proposed expulsion, they shall advise the person proposed to be expelled to withdraw from the Institute. If that advice be followed, no entry shall be made on the minutes, nor any public discussion on the subject be permitted. But if that advice be not followed, nor a satisfactory explanation given, the Council shall call an Extraordinary General Meeting of members for the purpose of deciding on the question of expulsion; and if a majority of the persons present at such meeting, provided the number so present be not less than fifty, who are entitled to vote, and shall vote that such individual be expelled, the Chairman of that meeting shall declare the same accordingly, and thereupon the individual shall cease to belong to the Institute.

26. The President, Vice-Presidents, Honorary Secretary, and Auditors shall be elected annually at the Annual General Meeting. Any casual vacancy in their number, or in the Council, may be filled up by the Council; but the person so elected to fill up any such vacancy shall continue in office so long only as the person in whose place he shall have been elected would have been entitled to continue if he had remained in office.

27. The President and Vice-Presidents shall in no case hold such office for a longer period than two years consecutively.

28. The appointment, suspension, and dismissal of the Secretary shall be in the discretion of the Council, who may determine his duties and fix the amount of his remuneration.

29. Four ordinary Members of the Council shall retire annually in rotation, and be ineligible for re-election during the following year. Members elected to a vacancy under Rule 26 shall not be ineligible for re-election.

30. The Council shall, previous to the Annual General Meeting in each year, prepare a list of members whom they nominate as suitable for the offices of President, Vice-Presidents, Honorary Secretary, and Auditors for the ensuing year. The list shall also contain the names of members who have been nominated as fitted to become Ordinary Members of the Council, of whom the Council shall nominate four. It shall be open for any member to propose any other member as a Vice-President or an Ordinary Member of Council; the consent in writing of such member having been first obtained. If the proposal be duly made and supported by the names of other two members, and sent to the Secretary on or before the 31st of March preceding the Annual General Meeting, the Council shall accept the nomination, and include the member so proposed in the voting list. No member shall propose or support the nomination of more than one member as a Member of Council in the same year. A copy of such list shall be forwarded to each Member of the Institute entitled to vote, at least fourteen days before the Annual General Meeting, and each member shall be at liberty to make a selection from the list, or to substitute the name or names of any other member or members; but the number of names so selected or substituted must not in any case exceed the number to be elected to the respective offices. The list must be returned in a sealed envelope, so as to be in the hands of the Secretary at least two clear days before the business of the Annual General Meeting begins. The Secretary shall deposit the lists in the ballot-box unopened. The ballot-box shall be opened by the Scrutineers appointed at the meeting; and when the scrutiny is completed, or as soon after as may be convenient, the names of the elected Office-Bearers shall be announced. A majority of votes of those members entitled to vote and shall vote at such election shall decide the election of the respective candidates; and where in any case the votes are equal in number, the casting vote of the President shall decide.

31. Every Member and Associate shall subscribe a sum of One Guinea per annum. Every Associate Member shall subscribe a sum of 15s. per annum.

32. Rule to remain.

33. Rule to remain.

34. Rule to be struck out.

35. Rule to remain.

36. Each Member, Associate Member, and Associate of the Institute not in arrear with his subscription, and each Honorary Member, shall be provided annually, by the Secretary, with a copy of the Transactions and Rules, and a list of the names and addresses of the members.

37. The Council shall submit to every Annual General Meeting the names of such persons as may have allowed their subscriptions to fall in arrear for two consecutive years, exclusive of the current year, whereupon the names of the defaulters shall be struck off the list, and they shall cease to have any advantage, right, or privilege in the Institute, unless sufficient cause be shown to the contrary. In the event, however, of any such person paying up all his arrears, he shall be entitled to re-admission at the option of the Council. A member struck off under this rule, or expelled under Rule 25, shall be none the less liable to pay to the Institute all subscriptions due up to the end of the current year in which he shall have been so struck off or expelled.

38. Rule to remain.

39. The Institute shall hold a General Meeting annually in June, to be called "The Annual General Meeting," at such place as may be decided upon at the previous Annual General Meeting. The date of the meeting shall be fixed by the Council.

40. Extraordinary General Meetings may be convened at any time by the President and the Council; and the Council shall, on the requisition of fifty members, convene such a meeting. The circular convening any such meeting shall state the objects thereof, and be sent by post to each Member of the Institute at least fourteen days previous to the date of the proposed meeting. No business shall be discussed at such meeting unless mentioned in the circular.

41. Rule to remain.

42. Rule to remain.

43. Rule to be struck out.

44. General questions shall be decided by show of hands, unless six members present at the meeting and entitled to vote, shall demand a poll in writing, in which event the poll shall be taken by ballot in such manner as the Chairman of the meeting shall direct. Questions of a personal nature shall be decided by ballot as aforesaid. The Chairman is to have a second or casting vote when necessary upon all questions which are to be decided by a bare majority.

45. Rule to remain.

46. Rule to remain.

47. Rule to remain.

48. The Council shall, for the furtherance of the objects of the Institute, and for investigations into matters connected with the manufacture and application of gas, have power to appoint Special Committees for special purposes, and to delegate to such Committees such of their powers under these rules as they shall think fit; but such Committees shall be subject to their control, and shall not expend any funds of the Institute other than such as shall have been voted for their use by the Council. Such Committees shall consist entirely of Members of the Institute; any member, whether on the Council or not, being eligible.

49. The members at any General or Extraordinary General Meeting shall have power to alter or add to these rules as they from time to time may determine; but in the event of any such alterations or additions being deemed necessary, notice of the same must be sent, in writing, on or before March 31 in each year, through the Secretary, to the Council, who may bring it before the Institute, if they think fit, and who shall be bound to do so on the requisition, in writing, of fifty Members of the Institute. But no such alterations or additions shall be made unless supported by the votes of two-thirds of the members present entitled to vote and shall vote.

Messrs. W. Parkinson and Co. have obtained the highest award—"First Order of Merit, with special mention for general excellence"—for their meters, &c., at the Melbourne Exhibition.

The Earl of Morley has been appointed Chairman of Committees of the House of Lords for the remainder of the session, in succession to the late Duke of Buckingham. Lord Balfour of Burley was proposed by Lord Salisbury; but the proposition was rejected by 95 votes to 77.

Mr. S. Crossland, who has been for some years in the service of the Elland Gas Company, has been appointed to fill the post of Manager to the Holmfirth Gas Company, rendered vacant by the removal of Mr. Porter to Elland, as announced last week.

The Directors of the British Water Gas Syndicate, Limited sent out the letters of allotment and regret last Wednesday. All applications for small amounts were returned; and the remainder, numbering some 1400 applications, received a fair *pro ratâ* allotment, as promised by the Company. A leading financial paper states that the amount was subscribed eight times over. The shares were quoted at 3 premium last Saturday.

At last Tuesday's meeting of the London County Council, the Deputy-Chairman (Mr. Firth) said it had been stated that the City Corporation intended to claim the City's 4d. out of the coal dues for the current year. If this were so, the Standing Committee would have carefully to examine it. As to the surplus of this year's coal dues, he thought it not unlikely that the Government might bring in a Bill on the matter, and possibly propose to apply the money towards making communications across the Thames below London Bridge.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 684.)

The Stock Markets opened last week rather cautiously, and business was limited; but a feeling of strength soon set in, and prices moved up pretty briskly. Later on, something of a check was sustained, owing to the usual proportion of realizations to secure profits; but the favourable tendency was not permanently impaired, and at the close there was a general show of firmness. The Money Market throughout has been easy; and some people have speculated on the Bank-rate going a little lower. The Gas Department has been very firm; and business on the whole has been good, though somewhat quiet on one or two days. Changes in quotations are numerous, and in some cases considerable. They are all, without exception, upward. Among Gaslight issues, good steady business has been daily transacted in the "A" stock; the top price marked being 264, and the closing quotation showing a rise of 4. The "H" 7 per cent. maximum has been dealt in to an unusual extent; but the opening figures have remained unchanged. The other maximum stock, the "B," has improved 1. There have also been several transactions marked in the other issues, the quotations of which have not moved. In South Metropolitans, moderate transactions have been marked in the "B" and the debenture stocks—the former advancing 1; but the others have not been touched. The "A" seems to stand rather too cheap, as prices go. Nothing, of course, has been done in Commercials; but the old stock went up 2 on Monday, and both the old and new rose 2 after the Company's meeting on Friday, which went off very well. A good deal—too much, perhaps—was said about electricity; but the speakers one and all agreed that so long as the London Companies continue to supply the public with good and cheap gas, they had nothing to fear from the competition of electricity; and that appears to be a sensible view to take of it. The Suburban and Provincial undertakings have had a little quiet business done in them, and they stand firm. Their changes in quotation comprise a rise of 3 in Brentford old, and 1 in ditto new; 1 in Bromley old, and ½ in ditto new. The Foreign Companies, in general, have been quiet and unchanged. Water has been very fairly active, and prices have been fully up to average—with the single exception of East London, which relapsed 1.

The daily operations were: Gas opened rather quiet on Monday; but transactions showed general firmness. Commercial old rose 2. Water presented no feature, except a tendency to weakness in East London. Gas business was again only moderate on Tuesday; though prices were well up to the mark. Water was fairly active and firm; but East London fell 1. Wednesday was a busy day in Gas, especially Gaslight issues. The "A" rose 1½; South Metropolitan "B," 1; Brentford old, 2; and ditto new, 1. Among Water Companies, Lambeth and West Middlesex were active at existing quotations. On Thursday, transactions in Gas were much more limited; but the upward movement was still in force. Gaslight "A" rose 1½ more; and Brentford old, 1. There was nothing at all to notice in Water. Friday's business was almost wholly in Gaslight "A," which continued to gain in strength, and was quoted 1 higher. Bromley old rose 1; and ditto new, ½. Water continued quiet and unchanged. Saturday brought more than usual activity in Gas. Several Gaslight issues were dealt in; but the only variation was a rise of 1 in "B." Commercial old and new improved 2 each. Very fair business was done in Water; but all quotations remained unchanged.

ELECTRIC LIGHTING MEMORANDA.

THE BOARD OF TRADE INQUIRY INTO PROPOSED SCHEMES FOR LIGHTING LONDON—ELECTRIC LIGHTING BY AMERICAN GAS COMPANIES—THE COST OF STREET LIGHTING IN AMERICA—THE AFFAIRS OF THE ELECTRICAL POWER STOREAGE COMPANY.

The most important subject for consideration in connection with electric lighting matters just now, is the Board of Trade inquiry which is being held by Major Marindin, R.E., into the proposals of the applicants for Electric Lighting Licenses for London. The inquiry commenced on Wednesday at the Westminster Town Hall, and a special report of the first portion of the proceedings will be found in another column. The business before the Inspector is very heavy; there being 18 applications before him, and innumerable objections to all of them. As many as 50 counsel are engaged in the inquiry, in addition to the officers directly representing local authorities. The first case taken was that of the London Electric Supply Corporation, as being the most comprehensive. This is the Company that has resulted from the Grosvenor Gallery experiment, and whose great works at Deptford, upon which £430,000 have already been spent, are intended to be the electrical wonder of the world. At this station the supply of current sufficient for 230,000 incandescent lamps is to be produced, which is to be taken into London by mains laid along the lines and across the bridges of the Southern Railway Companies, from which the streets are to be supplied at convenient intersecting points. The Company sought powers over a very large area; but welcomed unlimited competition. It is undesirable to summarize the evidence tendered in favour of the Company's claims, the greater part of which is mere assumption. Our report will be found the best guide upon this matter.

The last number which has reached us of the *Progressive Age* contains a list of United States gas companies supplying electric lighting, professedly corrected up to date. It shows a total of 266 companies, supplying a total of 21,313 arc and 55,890 incandescent lamps, representing 21 different systems; and is not claimed to be quite complete. The most favoured arc light is the Thomson-Houston, which heads the list with 11,084 lamps; the Brush being a bad second, with 3964 lamps; and the American a poor third, with 1813 lamps. None of the others runs into four figures. Of the incandescent lamps, the majority, of 27,710 lamps, belong to the Westinghouse system; the Edison coming in second, but a long way behind, with 10,256 lamps. After this come the Thomson-Houston, with 8826 lamps, and the United States, with 4425 lamps. There appears to be a much greater choice among arc lamp systems than in incandescent lighting; the former being more popular in the United States than with us. A favourite combination appears to be the Thomson-Houston arc and Westinghouse incandescent. The largest plant of this kind is stated to be that of the St. Paul (Minnesota) Gas Company, who have 700 arc and 4000 incandescent lamps on rental. The engines employed in the service are of 2500-horse power. The station building contains the motive power on the ground floor and the dynamos on the first floor. Our contemporary predicts that in six months' time the number of entries in this list will be doubled.

At the recent Chicago meeting of the National Electric Light Association, Mr. Fred. H. Whipple read a paper upon "Municipal Lighting," which was a general statement concerning the use of arc lamps for street lighting in the States, whether owned by municipalities or speculative companies. He remarked, in the course of the paper, that there are to-day in the United States 316 cities and towns whose streets are wholly or in part illuminated by electric lights furnished under a public contract. The highest price for an arc lamp of the ordinary power, burning all night, is $360, or about £75 per annum. The lowest price is $40, or £8 6s. 8d. Between these extremes there are 186 prices. This difference is very remarkable. The average cost of all-night public lighting in the States is $121, or £25 4s. 4d. per lamp. The price has been steadily diminishing for several years, and to a very large extent within the past few months. Late contracts show a reduction of at least 25 per cent. Having endeavoured in vain to ascertain the proper basis for the charge for a lamp, Mr. Whipple is driven to confess that "there is really no fixed basis upon which to charge for public lighting, nor any general data by which a fair rate may be arrived at"—which means that the charge is regulated by what the municipal authorities can be induced to pay for it. He thinks that in average sized towns the prime cost of arc lighting may be taken at $92, or £19 1s. 8d. per annum for all night, with interest and depreciation. As to the ownership of lighting plants by municipalities, Mr. Whipple emphatically declares that this idea is not feasible in the United States, where corruption in municipal government is the rule rather than the exception, and the public are as a rule better served by trading companies.

The Directors of the Electrical Power Storeage Company have issued their report for the past year, in which they state that the Company have made a gross profit of £13,273; but it appears that interest, &c., has to be paid out of this to the amount of £11,709, so that the net balance approaches that vanishing point which is so conspicuous in the returns of most electric lighting and supply companies. Still, there is a small profit, which, added to the amount carried forward from previous accounts, makes a grand total of £8372, "out of which the Directors would recommend a dividend were it not that the increasing volume of business demands a larger working capital, and the best method of securing this has been, and is, a subject of anxious consideration by the Directors"—which is as much as to say that the Board will not divide a penny of what they call their profit, because if they parted with it they would not know where to go for money wherewith to carry on their business. This is a striking confession for the Directors of a professedly profit-making Company. For a wonder the Company are not engaged in any litigation. The Directors hope that the present revival of schemes for lighting London under the amended Electric Lighting Act will bring some orders to the Company; but as a matter of fact the most pretentious of these projects will have nothing to do with storeage batteries. The report makes the most of the experimental use of storeage batteries for boat propulsion, omnibus lighting, and similar small matters; but it is difficult to see how a good dividend on the capital can be made out of such business as the Directors appear to have in view.

A hint that may be useful in engineering drawing offices is given in the *Deutsches Baumgewerbes-Blatt*, concerning a new method of copying drawings. Any kind of opaque drawing paper in ordinary use may be employed for this purpose, stretched in the usual way over the drawing to be copied or traced. Then by the aid of a cotton pad, the paper is soaked with benzine. The pad causes the benzine to enter the pores of the paper, rendering the latter more transparent than the finest tracing paper. The most delicate lines and tints show through the paper so treated, and may be copied with the greatest ease; for pencil, Indian ink, or water colours take equally well on the benzinized surface. The paper is neither creased nor torn, remaining whole and supple. Indeed, pencil marks and water colour tinting last better upon paper treated in this way than on any other kind of tracing paper, the former being rather difficult to remove by rubber. When large drawings are to be dealt with, the benzine treatment is only applied in parts at a time, thus keeping pace with the rapidity of advancement of the work. When the copy is completed, the benzine rapidly evaporates, and the paper resumes its original white and opaque appearance without betraying the faintest trace of the benzine. If it is desired to fix lead-pencil marks on ordinary drawing or tracing paper, this may be done by wetting it with milk and drying in the air.

ACCOUNTS OF THE METROPOLITAN GAS COMPANIES FOR THE YEAR 1888.

—	Chartered.	Commercial.	South Metropolitan.	All the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money	10,690,900 0 0	809,890 0 0	2,723,433 0 0	14,224,223 0 0
Income—viz.:				
Sale of gas by meter	2,250,769 4 4	218,529 10 9	622,319 1 10	3,091,617 16 11
Public lights, including lighting and contracts	132,967 14 3	17,856 11 4	57,256 14 5	208,081 0 0
Rental of meters and stoves	56,075 3 6	5,425 13 9	15,917 8 6	77,418 5 9
Residual products	700,281 1 11	79,339 14 5	228,324 4 11	1,007,945 1 3
Miscellaneous, including old materials	10,785 3 10	882 3 5	4,938 6 0	16,605 13 3
Total income from all sources	3,150,878 7 10	322,033 13 8	928,755 15 8	4,401,667 17 2
Expenditure—viz.:				
Coals, including carriage and dues	1,078,486 10 4	117,165 2 11	317,879 18 2	1,513,531 11 5
Purifying materials, including labour	52,751 7 0	5,965 7 1	14,087 8 2	72,804 2 3
Salaries and wages—manufacture	260,552 7 10	31,451 13 4	85,372 7 0	377,376 8 2
Wear and tear—manufacture	234,847 3 3	19,132 5 5	75,414 15 3	329,394 3 11
Rents, rates, and taxes	155,336 15 0	9,646 0 8	36,840 6 0	201,823 1 8
Salaries—management	14,711 19 3	2,078 19 0	4,719 14 2	21,510 12 5
Collectors' salaries and commission	29,103 15 7	3,114 3 3	10,472 7 0	42,690 5 10
Stationery, printing, and general charges	10,005 4 6	1,777 16 1	7,500 7 7	19,283 8 2
Directors and auditors	5,900 0 0	2,550 0 0	3,725 0 0	12,275 0 0
Salaries and wages, wear and tear—distribution	120,510 15 0	12,505 12 6	46,865 8 2	179,881 15 8
Repair and renewal of meters and stoves	34,486 10 1	3,314 6 5	8,478 19 6	46,279 16 0
Law and parliamentary charges	2,775 2 11	183 7 3	822 12 7	3,781 2 9
Bad debts and extraordinary expenses	41,537 6 0*	3,847 16 6	6,625 18 11	52,011 1 5
Total expenditure on revenue account	2,041,004 16 9	212,832 10 5	618,805 2 6	2,872,642 9 8
Gross profit	1,109,873 11 1	109,201 3 3	309,950 13 2	1,529,025 7 6
Do. per cent. on capital and borrowed money	10 7 8	13 9 8	11 7 8	10 15 0
Do. do. gas-rental	46 11 3	46 3 11	45 12 2	46 6 9

* Including £21,877 7s. 9d. annuities and retiring allowances, paid under Amalgamation Schemes.

TABLE *showing the Capital, Income, Expenditure, and Profit, per Ton of Coal carbonized, in* 1888.

—	Chartered.	Commercial.	South Metropolitan.	All the Companies.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Capital and borrowed money	6 0 3·59	4 2 10·20	4 13 0·40	5 11 2·37
Income—viz.:				
Total gas-rental	1 6 9·87	1 4 2·18	1 3 2·57	1 5 9·54
Rental of meters and stoves	7·57	6·66	6·53	7·26
Residual products	7 10·56	8 1·40	7 9·60	7 10·56
Miscellaneous, including old materials	1·46	1·08	2·02	1·56
Total income from all sources	1 15 5·46	1 12 11·32	1 11 8·72	1 14 4·92
Expenditure—viz.:				
Coals, including carriage and dues	12 1·63	11 11·83	10 10·31	11 9·98
Purifying materials, including labour	7·12	7·32	5·77	6·83
Salaries and wages—manufacture	2 11·18	2 2·61	2 11·00	2 11·40
Wear and tear—manufacture	2 7·71	1 11·49	2 6·91	2 6·90
Rents, rates, and taxes	1 8·98	11·84	1 3·10	1 6·93
Salaries—management	1·99	2·55	1·93	2·02
Collectors' salaries and commission	3·93	3·82	4·29	4·01
Stationery, printing, and general charges	1·35	2·18	3·07	1·81
Directors and auditors	0·80	3·26	1·53	1·15
Salaries and wages, wear and tear—distribution	1 4·27	1 3·35	1 7·21	1 4·88
Repair and renewal of meters and stoves	4·66	4·07	3·48	4·34
Law and parliamentary charges	0·37	0·22	0·34	0·35
Bad debts and extraordinary expenses	5·60	4·73	2·72	4·88
Total expenditure on revenue account	1 2 11·59	1 1 9·27	1 1 1·66	1 2 5·48
Gross profit	12 5·87	11 2·05	10 7·06	11 11·44

TABLE *showing Increase or Decrease in each Item during* 1888 *compared with* 1887.

—	Chartered.		Commercial.		South Metropolitan.		All the Companies.	
	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.	Inc.	Dec.
	£	£	£	£	£	£	£	£
Capital and borrowed money	..	..	8,656	..	52,195	..	60,851	..
Income—viz.:								
Sale of gas by meter	..	129,000	11,937	..	25,438	..	..	91,625
Public lights, including lighting and contracts	..	10,464	..	530	977	..	..	10,016
Rental of meters and stoves	1,542	..	194	..	950	..	2,716	..
Residual products	91,352	..	9,870	..	42,581	..	143,802	..
Miscellaneous, including old materials	153	..	..	93	..	824	..	765
Total income from all sources	..	46,387	21,378	..	69,122	..	44,112	..
Expenditure—viz.:								
Coals, including carriage and dues	12,953	..	1,418	..	9,719	..	24,090	..
Purifying materials, including labour	1,493	..	..	157	..	710	625	..
Salaries and wages—manufacture	9,453	..	828	..	2,045	..	12,327	..
Wear and tear—manufacture	17,742	..	..	1,171	17,228	..	33,798	..
Rents, rates, and taxes	4,112	..	106	..	717	..	4,936	..
Salaries—management	667	..	20	..	..	16	670	..
Collectors' salaries and commission	81	..	76	..	..	573	..	416
Stationery, printing, and general charges	..	175	..	155	1,837	..	1,507	..
Directors and auditors	..	..	..	..	..	..	..	..
Salaries and wages, wear and tear—distribution	..	11,348	..	25	8,549	..	..	7,824
Repair and renewal of meters and stoves	..	6,284	359	..	789	..	..	5,135
Law and parliamentary charges	..	7,570	63	..	..	631	..	8,139
Bad debts and extraordinary expenses	..	4,695	56	..	735	..	..	3,905
Total expenditure on revenue account	16,429	..	1,418	..	34,689	..	52,535	..
Gross profit	..	62,816	19,960	..	34,433	..	..	8,429
Do. per cent. on capital and borrowed money	..	11s. 9d.	46s. 11d.	..	21s. 3d.	..	..	2s. 0d.
Do. do. gas-rental	1s. 9d.	..	130s. 10d.	..	68s. 6d.	..	22s. 8d.	..

Notes.

A Water-Level or Gasholder Indicator.

An indicator for showing at a distance and recording the height of gasholders, the level of water in reservoirs, &c., has been devised by Mr. G. E. Winslow, of Waltham, Massachusetts, and, according to the *Engineering and Building Record*, has been used at the water-works of the town for two years with success. The apparatus comprises two elements—the transmitter and the indicator. The first-named section of the arrangement consists of a case containing a pulley, which is capable of being revolved in either direction by a wire attached by one end to a float, in the case of a reservoir, or to the gasholder, and carrying a counterbalance weight at the other end. This circular movement of the pulley closes an electrical circuit at certain points corresponding to divisions on a dial, and also rings an alarm bell when a desired level has been reached. The indicating and recording dials may be placed anywhere in electrical connection with the transmitter. One dial marks feet and inches, and bears a pointer which shows the height on the circular scale. The recording dial is marked in circles for feet, or other divisions that may be suitable for the purpose for which it is employed, and also in curved radial lines for hours and days of the week. Three wires are required for connecting the transmitting and indicating halves of the arrangement; or, with a special relay, two wires will serve. The indicator and recorder are enclosed in a case with a glazed front, for affixing to an office wall, and have a neat appearance.

The Protection of Water-pipes from Freezing.

Some remarks on the freezing of water-pipes were made by Mr. F. R. Jones, of Boston, Massachusetts, at a recent meeting of the New England Water-Works Association. Mr. Jones observed that it was popularly understood that water-pipes encased in rosin would not freeze; but his experience did not bear out the idea. His first experiment of the kind was with a 2-inch pipe enclosed in a 6-inch square trough, poured full of melted rosin, and intended to carry water across a tidal channel. Although thus protected, and buried as deep in the bottom of the channel as tide work would permit, the pipe froze up, notwithstanding that the water was kept constantly running. Another experiment was with a pipe carried underneath a wooden wharf in an exposed and very cold situation. This was enclosed in an 8-inch trough, filled with coal-tar pitch. It still froze up. After trying various devices for keeping out frost from water-pipes, Mr. Jones came to the conclusion that there are only three rules that can be trusted to work satisfactorily. One is to keep the water running, which is generally effectual, but apt to be expensive. Another is to empty the pipe between the times when the water is required, which is the safest plan. The third is to keep the surroundings of the pipe warm. These methods of preventing water-pipes from freezing up in cold weather are sufficiently obvious; but they are placed upon record in order to draw attention to the fact that no other devices for attaining the same object can be depended upon during really severe and protracted frost.

The Synthesis of Water.

Lord Rayleigh has lately read a paper before the Royal Society describing his efforts to obtain a lighter and purer hydrogen gas than is procurable by means of the usual reaction with sulphuric acid. The reason for this endeavour seems to have been the desire to establish a correct ratio between the densities of hydrogen and oxygen, the latter of which is given in the text-books as being to the former as 16 to 1. With hydrogen prepared in the ordinary way, however, and combined with oxygen in the experimental formation of water, Lord Rayleigh had made the ratio 15·884. He accordingly tried to prepare a lighter hydrogen, or a hydrogen free from any trace of nitrogen, by liberating the gas from potash by aluminium. The result was disappointing. He also tried to purify hydrogen yet further by absorption in palladium. It appears from experiments conducted by Mr. Keiser that palladium will not occlude nitrogen; and Lord Rayleigh therefore sought to make use of its selective power for purifying his hydrogen. As the result of even this treatment, however, he has no improvement to report; the density of the gas being almost exactly as before. Proceeding, with the purest hydrogen available, to prepare water by igniting the gas with oxygen under carefully studied conditions, Lord Rayleigh first finds the mean of the two densities to be 15·95, which number "represents the atomic ratio of oxygen and hydrogen as deduced immediately from the weighings with allowance for the unburnt residue." By making another correction, for buoyancy, the final number for the atomic weight of oxygen is reduced to 15·89—being somewhat lower than was formerly obtained by Lord Rayleigh, who does not, however, lay much stress upon the result, which he evidently regards as not final.

A Novel Iron-Making Process.

A revolution in the manufactured iron trade is threatened by the reported success of a new process of conversion—the invention of M. Gustave L. Robert, of Stenay, France—which has been taken up and perfected by Mr. J. W. Bookwalter, of Springfield, Ohio. The process is somewhat analogous to that of Bessemer, inasmuch as a similar converter is employed, and the molten metal is treated by an air-blast. But whereas in the Bessemer converter the air is blown vertically upward through the mass of liquid iron, in the Robert converter the blast is directed horizontally over the edge of the iron. The effect of this is the production of a violent rotary motion and agitation of the metal, which presents every portion of it in turn to the blast, and at the same time blows the slag and other impurities which float on the surface of the molten metal to the other side of the converter. It will be seen that this is tantamount to puddling by air power; and the result is the same as with hand puddling. The air first burns up the silicon, then the carbon, and would attack the iron last if the process were continued sufficiently long. By stopping the process at different stages, however, it is stated that every grade of iron from the purest wrought iron to highly carbonated steel can be produced from the same converter at the minimum of cost. It is claimed that the process is easy and cheap to set up and work, and that the cost of making all grades of iron and steel is the same, and falls below that of making Bessemer steel.

Communicated Article.

THE CHEMISTRY OF ILLUMINATING GAS.

By Norton H. Humphrys, Assoc. M. Inst. C.E., F.C.S.

XIV.

In 1876, M. Berthelot published the results of some experiments and researches on the gas supplied to Paris;* and these attracted a great deal of attention, as showing that the hydrocarbons in Paris gas were of a very different composition to those found in English gas, or indeed one might almost say, in samples of commercial coal gas from any other town. Whereas all other investigators had considered that the hydrocarbons consisted chiefly of the ethylene series, M. Berthelot found that in the Paris gas, benzol was the chief illuminating constituent. He remarks that all the pyrogenous carburets of hydrogen are, in his experience, allied by regular laws of transformation, and by such relations of equilibrium that the existence of any one of them at a cherry-red temperature brings about as a consequence the successive formation of all the others. He caused about 50 litres (1·76 cubic feet) of gas to pass very slowly through a small quantity—about one-half a cubic inch—of fuming nitric acid. The acid was subsequently diluted with water which caused a precipitate to separate, and this consisted of nitro-benzene, containing also toluole and other products. By weighing the precipitate, the quantity of benzene may be approximately estimated. Applying this process with certain precautions, he satisfied himself that the gas contained 3 to 3¼ per cent. of benzene. The absorption by bromine with similar gas was 3·7 per cent.; and that by boiled sulphuric acid, 1·8 per cent., including the water vapour. As this was 1·6 per cent., only 0·2 per cent. remains to represent the hydrocarbons absorbed by the boiled sulphuric acid. The residue remaining from the treatment with sulphuric acid was treated with bromine, and the absorption was 3·5 per cent. All the experiments are somewhat indefinite in character.

M. Berthelot divides the illuminants into three classes: 1. Those absorbable by fuming nitric acid, which may be regarded as benzol. 2. Those absorbable by boiled sulphuric acid, consisting of butylene, crotonylene, propylene, &c. 3. Those removed by bromine, but not by fuming nitric acid or by boiled sulphuric acid, comprising ethylene and acetylene. The benzol was determined as above described. A number of experiments were tried on the illuminants removed by passing the gas through a small scrubber charged with lumps of pumice soaked in concentrated sulphuric acid. The acid, being allowed to stand in a compartment purposely left at the base of the scrubber, gradually separated from the hydrocarbons, which formed a layer of liquid floating on the surface. About one ounce of the liquid hydrocarbon was obtained from 3500 cubic feet of gas; and this was subjected to further examination by fractional distillation, analysis of the fractions, &c. The following are the conclusions arrived at, stated in parts per million volumes of gas:—

Benzol ($C_6 H_6$)	30,000 to 35,000
Acetylene ($C_2 H_2$)	1000 about
Ethylene ($C_2 H_4$)	1000 to 2000
Propylene ($C_3 H_6$)	2·5
Allylene ($C_3 H_4$)	8·0
Crotonylene ($C_4 H_6$)	31·0
Terene ($C_5 H_4$)	42·0
Sundry carburets	98·0

From this it would appear that for all practical purposes, the illuminants may be regarded as benzol, as that substance is stated to constitute more than 90 per cent. of the total absorbable hydrocarbons.

M. Berthelot concludes his paper by noticing several reactions which he has found by experiment to take place at a red heat with dry distillation. These are: 1. the reciprocal and direct metamorphosis of the four fundamental hydrides of carbon, acetylene ($C_2 H_2$), ethylene ($C_2 H_4$), methyl (CH_3), and marsh gas (CH_4), which constitute with hydrogen a system in equilibrium, by which all four are formed at a cherry-red temperature at the cost of the particular one among them taken as a starting point. 2. That free marsh gas directly engenders ethylene and other hydrocarbons of the series $(CH_2)_n$. 3. That free acetylene generates benzol and hydrocarbons of the series $(C_2 H_2)_n$, amongst which benzol predominates on account of its greater stability. The four fundamental bodies will also combine two by two to form more complicated products. To prevent confusion, it may be well to remark here that the boiled sulphuric acid above referred to is a different

* See Journal, Vol. XXVIII., p. 94.

substance to the fuming sulphuric acid now generally preferred as an absorbant for the whole of the condensable hydrocarbons in coal gas. Boiled sulphuric acid always retains a little water, and its constitution may be represented thus: 12 (H_2SO_4) H_2O. Fuming sulphuric acid consists of one equivalent of hydrogen sulphate (popularly known as sulphuric acid) combined with one equivalent of sulphur trioxide (anhydrous sulphuric acid); and its composition is: $H_2SO_4\,SO_3$.

M. Berthelot's conclusions were not allowed to go unchallenged. Professor Dittmar tried a number of experiments with Glasgow gas.* He found that fuming nitric acid would absorb ethylene as well as benzol; and also that when a mixture of benzolated hydrogen, containing 6 per cent. of benzol was shaken with water, about two-thirds of the benzol was dissolved from the gas. From this fact he concluded that but little of the benzol that may be present in the gas as it issues from the retort would survive the process of purification. And it may therefore be worth while to examine crude coal gas both for illuminating value and for benzol, so as to ascertain if any important loss takes place from this source in practice. By passing dried Glasgow gas over a coil of vulcanized sheet india-rubber (which he found to be capable of absorbing the benzol without touching the other hydrocarbons) and then through bromine, he obtained a bromide which was decomposable by alcoholic potash, and therefore could not be a bromide of benzol. The bromine, after treatment with the gas, was washed with dilute caustic soda, dried by means of fused chloride of calcium, and distilled. The distillation point, and percentage of bromine, showed that the substance consisted of bromides of hydrocarbons of the ethylene series, in which ethylene was largely represented. From this he concluded that the hydrocarbons in Glasgow gas consisted chiefly of ethylene and bodies belonging to that class, as had always been supposed. One important point against the conclusions of M. Berthelot is the illuminating power of Paris gas. As will presently be seen, benzol is much more powerful as an illuminant than ethylene and similar hydrocarbons; and the composition as above stated should give a gas of very high photometrical value, notwithstanding the low percentage of illuminants. In a theoretical sense, it is a perfect gas. But it is notorious that the quality of Paris gas is only about 13 candles—a quality that would not be tolerated in many of our English towns. If it really contains 3 per cent. of benzene, the only conclusion available is that it is largely diluted with nitrogen or carbonic acid.

But the theory that the illuminating value of coal gas is due rather to easily condensable vapours of the benzol class than to permanent gaseous hydrocarbons, such as ethylene, has received substantial support. Mr. G. E. Davis, writing to the *Chemical News*,† says the older analyses of coal gas gave but a very poor insight into its composition, and that many of the deductions are not worth the paper they have been printed on. The real and most important constituents of coal gas have been overlooked. It was supposed that the greater portion of the illuminants were ethylene or liquids of such low boiling point as to be reckoned practically with the permanent gases. Lengthened investigations had satisfied him that a great mistake had been made on this point, and that the chief illuminants in coal gas were vapours of easily condensable hydrocarbons, commencing to boil at or below 65° Fahr., and containing many hydrocarbons even up to solid naphthalene. These illuminants were easily absorbed by olive, rape, or even hydrocarbon oils; and a ton of good gas coal would yield more than four gallons. The residual gas would possess a very feeble luminosity. Mr. Davis said that these hydrocarbons were worth more than the original coal *plus* materials and labour, and therefore, that where gas was used for heating or cooking, it would be profitable to extract them. He proposed to call the fluid so obtained "crude benzol." The quality of this crude benzol would be greatly affected by the conditions of distillation, temperature, &c. If the heat was too low, more paraffin would be formed.

Mr. Davis entered into the details of his project at some length in a paper read before the Society of Chemical Industry, in 1883,‡ which includes a large amount of information that he has collected on the subject. In the course of it, he refers to the following published analyses, which in addition to the particulars we have already noticed, attempt some explanation of the character of the hydrocarbons. No. 1 is from the first edition of Bunsen's "Gasometry;" No. 2 from the second edition; and No. 3 is given by Dr. Fischer in *Dingler's Journal*.

Hydrogen	45·58	..	46·20	..	46·27
Marsh gas	34·90	..	34·02	..	37·55
Carbonic oxide	6·64	..	8·88	..	11·19
Carbonic acid	3·67	..	3·01	..	0·81
Sulphuretted hydrogen	0·29	..	—	..	—
Nitrogen	2.46	..	2·15	..	1·01
Oxygen	—	..	0·65	..	—
Hydrocarbons.					
Ethylene	4·08	..	2·55	..	2·11
Propylene	—	..	1·21	..	0·37
Butylene	2·38	..	—	..	—
Benzol	—	..	1·33	..	0·69
	100·00		100·00		100·00

He appears to be of opinion that a comparatively large quantity of benzol vapour must have been present in all the samples of gas, for he says: "My own experiments lead me to suppose that coal gas is a mixture of hydrogen with those members of the methane and ethane series that are gaseous below freezing point; and the mixture is permeated to a greater or less degree with the vapours of all the volatile hydrocarbons found in the tar up to at least solid naphthaline." In one experiment which he tried, gas from Silkstone coal was passed through olive oil, with the result that the illuminating power was reduced to 8 candles, showing that the larger proportion of the hydrocarbons were removed. On heating the oil to 260°, nothing distilled off; but on blowing steam through it, a volatile hydrocarbon liquid was obtained, in quantity equivalent to about 4 gallons per ton of coal. In order to secure the free absorption of the hydrocarbons by the oil, it is necessary that the operation should be conducted at a temperature not much above freezing point. Mr. Davis gives full particulars of the experiments upon which his conclusions are based. In the course of a very elaborate examination of what he calls crude benzol, he found that it contained 50 per cent. of pure benzol; and taking his estimate of 4 to 5 gallons of crude benzol per ton of coal, it follows that one ton of coal will yield 2 to 2½ gallons. Since the specific gravity of benzol is about 0·9, the weight of this quantity would be 120,000 to 150,000 grains, which should be diffused through about 10,000 cubic feet of gas. This would give 60 to 75 grains per 5 cubic feet of gas; and according to the experiments of Knublach, 120 grains of benzol are capable of yielding an illuminating value of over 14 candles. Therefore the value of the benzol yielded by coal is by itself equal to 6 or 7 candles, or nearly one-half that actually obtained in practice.

Mr. Davis was pursuing the subject from a different point of view to that in which gas engineers would look at it. His object was to extract the benzol as a profitable commercial operation; but we are rather concerned in endeavouring to see how it can be kept in the gas. The attention of Mr. R. B. Taber, of New Bedford, was attracted by these researches on the possibility of removing benzol by treatment with oil at a low temperature; and that gentleman read a paper on the subject to the New England Association of Gas Managers,* directing attention to the practical effect of this reaction on gas exposed to contact with cold tarry matters in the condensers or scrubbers, or any part of the purifying apparatus. He gives some tables showing the result of tests taken on the gas at New Bedford at two stations 2000 yards apart, extending over a twelvemonth. In the winter when the air temperature was below freezing point, the gas lost 8 or 9 per cent. of its illuminating power; and in the summer, with a temperature up to 70°, it gained nearly as much. The experiments quoted by Mr. Davis were considered explanatory of these results, as showing that some benzol was condensed in the mains. Some fluid hydrocarbon obtained by exposing 17-candle gas to a temperature of 32° was exhibited at the meeting. About 3 per cent. of water vapour and 3½ per cent. of fluid hydrocarbon was deposited, but yet the gas was only reduced to the extent of 0·5 candle in value. The removal of the water would of course improve the value of the gas, so that the loss was to an extent compensated for. But it is scarcely correct to regard the results that follow the exposure of gas to a low temperature as nothing more than a simple condensation of vapours. There is every reason to suppose that, in addition, various chemical reactions come into play. And these reactions are of so delicate a nature, that it is scarcely warrantable to take the results obtained by distilling and fractionating the substances absorbed by oil or bromine, as actually illustrating the composition of the hydrocarbons as they exist in the gas. Looking at the matter in a plain, practical way, it is certain that the coal gas as supplied in this country is to all intents and purposes permanent under the usual conditions of supply. If allowed to travel slowly through pipes at freezing point or lower, as in the case of a lamp-service carried up a wall to a bracket, some deposition takes place, which may consist of hydrocarbons, in addition to the freezing of the water vapour in the gas. It would be impossible for fluids to be deposited to any important extent in the winter, and taken up again in the summer, without the fact becoming apparent in some way or another.

THE DINSMORE GAS PROCESS.—We have received from Mr. Isaac Carr the following particulars of the working of this process at Widnes from Nov. 29, 1888, to the 1st inst.:—Coal carbonized (Arley Mine nuts), 347 tons 11 cwt. 2 qrs.; gas made, 4,227,000 cubic feet; or at the rate of 12,161 cubic feet per ton, of an average illuminating power of 22·17 candles. The quantity of tar used per ton of coal carbonized was 7 to 8 gallons. Mr. Carr adds that the process continues to work most satisfactorily.

THE DEACON WATER-METER IN EDINBURGH.—With reference to the observations of our Edinburgh Correspondent a fortnight ago on the subject of the saving effected by the adoption of the Deacon waste-prevention system in Edinburgh, we are asked to mention that the report presented to the Works Committee of the Water Trust, which gave rise to our correspondent's remarks, was an interim one only; two of the districts to be dealt with having been barely started upon, and only that in which a saving of 33 per cent. was shown being at all out of hand. In this district the supply was only 21 gallons per head at starting; the average for the whole of Edinburgh being 41 gallons. The figures were submitted by the Engineers of the Trust, who had entire control of the matter, and not by representatives of the Deacon Company. As the trial of the system must be regarded as only in its early stages, discussion of the results so far achieved is perhaps scarcely advisable.

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* See JOURNAL, Vol. XXVIII., p. 668.
† *Ibid.*, Vol. XLII., p. 883. ‡ *Ibid.*, Vol. XLIII., p. 143.

* See JOURNAL, Vol. XLIII., p. 824.

Register of Patents.

GAS-ENGINES FOR TRAMCARS.—Blessing, O., of Rendnitz, near Leipzig. No. 1381; Jan. 30, 1888. [11d.]

This invention consists in certain improvements in gas and other hydrocarbon engines; being more particularly applicable to those employed for driving tramcars, &c. The "improvements" may be classed under three heads: (1) Means for reversing the motor, (2) for controlling the speed of the motor, and (3) for silencing or deadening the noise. For reversing the motor, suitable cams are provided on the shaft; the cams being in two sets formed as one piece, and capable of sliding longitudinally on the shaft without revolving thereon. In the cam-piece are one or two grooves for engagement of a bolt for holding the cam-piece in position. The valve-rods of the mixing and igniting valves are provided with friction-wheels for riding on the cams, and with springs, whereby they are held to the cams. On the rods are pins or noses; and to the frame is hinged a lever carrying the bolt. On depressing the lever, the bolt is withdrawn from the groove in the cam-piece, and the valve-rods are depressed by abutment of the lever on the pins on the rods. The cam-piece is thus left free to be moved along the shaft to bring into position the corresponding cams, by which the action of the engine is reversed. For checking the speed of the motor, and therefore of the vehicle driven thereby, a spring is provided for controlling the governor of the engine, and a cap for compressing more or less the spring. The cap is moved through suitable rod and lever connections by handles at either end of the car. The governor is caused, when the desired speed is exceeded, to move, by levers, the set of cams, so that the valve-rods are brought in operation by certain modified cams in the set; whereby the valves are so operated that the engine is driven with less power. For silencing or deadening the noise of the explosion and exhaust, the exhaust gases pass out through the pipe or series of pipes and chambers having different diameters. In the chambers are provided valves through which air may be sent into them; and thus into the cylinder of the motor in the event of failure of an explosion.

COMPOUND GAS MOTOR ENGINE.—Crossley, W. J., of Manchester. No. 1705; Feb. 4, 1888. [11d.]

This invention relates to the construction and arrangement of a gas or oil motor engine in such a manner that it operates as a compound engine—that is to say, the gaseous products of combustion are (after propelling a piston) utilized for performing further work by acting expansively on a larger area of piston before being finally discharged as exhaust.

For this purpose, there are arranged side by side two cylinders, having their pistons both connected to one crank; so that they move to-and-fro together. Each cylinder is provided with governing, charging, and discharging valves, worked as in gas-engines of the "Otto" kind; but the action of the valves for the one cylinder is so timed in regard to the action of the valves for the other cylinder that, when the one piston is drawing in a charge, the other piston is being propelled, and, when the one piston is compressing the charge, the other is expelling the products of combustion—all the operations being performed, in the usual way, at the rear ends of the cylinders. The cylinders are closed at their front ends, where their piston-rods pass through stuffing-boxes; and there is a communication from the discharge-valves of both cylinders to the front ends of both, and thence to an exhaust-valve common to both. As the two pistons make their back stroke together (one of them expelling products of combustion), these products, instead of escaping as exhaust, pass to the front ends of both cylinders and press on both pistons, expanding to nearly double their volume, and thereafter they are expelled as exhaust during the forward stroke of the pistons.

INDICATING THE FLOW OF LIQUIDS OR GASES.—Abel, C. D.; communicated from P. Kotliarewski, of St. Petersburg. No. 3017; Feb. 28, 1888. [8d.]

This invention relates to apparatus whereby the speed of a current of water or gas is indicated by sounds given at intervals of time, the duration of which is used as a means for determining the speed of the flow. The apparatus consists of a frame, which is suspended in the current by a wire rope, and is also provided with a rudder or tail for keeping it in one position in the current. In this frame is mounted a horizontal shaft, carrying a number of oblique or screw vanes, with their geometrical axis lying in a plane at right angles to the current; so that, by the action of the current on the vanes, the axis is rotated at a speed depending upon that of the current. The axis carries a toothed pinion in gear with a toothed wheel, whose axis is also mounted in the frame, and carries a metal tube closed at the ends extending at right angles to an equal distance on either side of the axis. In this tube is a loose weight, which, as the wheel and the tube are rotated by the axis carrying the vanes, falls alternately from one end of the tube to the other; and, in coming in contact with the ends thereof, produces a sound, which is conveyed along the suspension rope or wire, or which may also be heard independently of these. As the number of sounds emitted in a certain interval of time will bear a definite proportion to the speed of the current, it will be evident, remarks the patentee, that the latter can always be ascertained by counting the number of sounds within a certain definite interval of time.

GAS-REGULATORS.—Anderson, H., of Everton, Liverpool. No. 3702; March 10, 1888. [6d.]

This invention relates to a consumers' regulator, "for enabling the flow of gas past the meter to be increased or diminished, and for indicating the quantity of gas passing." The apparatus has a casing containing a pulley carried on a spindle free to rotate in bearings in the case. To the spindle or pulley is attached a handle for actuating it; and a chain attached to it, and crossed over two guide-pulleys, is employed to give motion to a tap or valve on the pipe through which it is desired to control the flow of gas. A finger secured to the spindle indicates on a dial the position of the tap or valve, and consequently the amount of gas flowing through the main or pipe.

GAS HEATING AND COOKING BURNERS.—Wright, J. F. and G. E., of Birmingham. No. 6372; April 30, 1888. [8d.]

This invention consists in the employment in atmospheric gas-burners for heating, cooking, or boiling purposes, of an additional chamber or chambers between the "mixing-chamber" and the injector-tube; the chambers being connected together by passages through gratings or otherwise, so as to split up the gaseous mixture.

REGENERATING GAS-LAMPS.—Korber, J. W., and Steuth, W., of Düsseldorf, Germany. No. 7386; May 18, 1888. [8d.]

This invention relates (1) to an arrangement for securing a bottom supply of air to a lamp of the "Fourness" type by an arrangement of tubes; (2) to the peculiar construction of the regenerator; and (3) to the arrangement for enabling the ignition of the lamp to be effected from the outside of the glass shade.

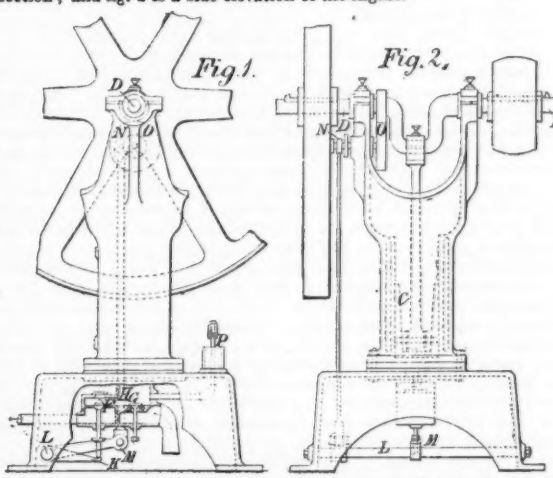
To realize the second object, the patentee arranges a conical form of regenerator, so that the direction of the nozzles thereby necessarily brought about causes the products of combustion to impinge against its surface in a more or less normal direction, and so communicate to it a greater heat than in the case of cylindrical regenerators. The air requisite for intense combustion cannot arrive at the flame in a direct line, as it must impinge against and around the surface of the zigzag nozzles in a winding direction, and over a relatively large heating surface; thus attaining a far higher temperature than when it has a direct course.

The ignition of the gas in this invention is effected from outside the glass shade by means of the following arrangement:—From the top of the stopcock a smaller gas-tube branches off, leading down to a small stopcock fitted with a small perforated tube, in which (close to the stopcock) a larger perforation is provided for effecting ignition. The principal stopcock being shut, the other one is opened, and the outflowing gas ignited. The burning flame springs from one perforation in the small perforated tube to another until it reaches the mouth of this latter, where an elongated thin flame forms in the direction of the burner. The main cock is then opened; the gas flowing to the burner is ignited; and the smaller cock at once shut.

GAS MOTOR ENGINES.—Purnell, J. J., of Webber Street, Lambeth. No. 10,165; July 12, 1888. [8d.]

The claim for this invention is that it provides a gas motor engine "with self-acting supply-valve and with heated pipe for ignition, adjustable in capacity, and always in free communication with the cylinder; thus dispensing with any ignition-valve and gear."

Fig. 1 is a front elevation of the engine, with the valve-case shown in section; and fig. 2 is a side elevation of the engine.



A vertical cylinder, open at the top, and surrounded as usual with a water-casing, is fitted on a hollow base. The cylinder has a trunk piston C connected to the crank on the fly-wheel shaft D, which is mounted in bearings carried overhead in brackets extending up from, and in one piece with, the cylinder. In the cavity of the base is a valve-case containing two valves F and G—both opening upwards to a space H in free communication with the interior of the cylinder. The one valve F is kept closed by a spring; and it is opened to discharge the exhaust by an arm K of a rocking-shaft L, which has another arm M connected to a crank N (or it might be an eccentric or cam on a countershaft driven by gearing O from the shaft D at half the speed). The other valve G is self-acting—opening to admit air; and it has a hollow seating, the annular cavity of which (connected to a gas-supply pipe) has numerous small perforations opening to the face of the valve seating. From the space H a passage leads to a vertical pipe P, which is kept heated by a gas-burner, and which has a cap that can be screwed more or less down, so as to diminish or increase the interior capacity of the pipe.

The action of the engine is as follows:—As the piston C ascends, the valve G rises and admits air mixed with gas into the space below the piston; the valve F at this time remaining closed. The piston then descends and compresses the gaseous mixture; and when the pressure is sufficient, a portion of the mixture forced into the heated pipe P becomes ignited, and the ignition is communicated to the charge in the cylinder, so as to propel the piston upwards. During its subsequent descent, the exhaust-valve F is opened, and the products of combustion expelled. By adjusting the cap of the heated pipe P (which after each ignition remains charged with products of combustion), the volume of the products contained in the pipe can be so regulated that their compression to the extent necessary to secure the ignition of the cylinder charge takes place just as the piston reaches the end of its compressing stroke. This dispenses with valve gear such as is usually employed to put the igniting apparatus in communication with the charge.

GAS-PRESSURE REGULATORS.—Bennett, O. W., of Washington, U.S.A. Nos. 18,410 and 18,411; Dec. 17, 1888. [6d.]

These inventions relate to the combination with an ordinary pillar gas-burner of a pressure-regulating plug made to fit inside and detachably connected with the pillar, and provided with passages along the sides at one end. An axial passage leads from the other end, and opposing or centripetal passages lead from the outside passages to the axial passage; the centripetal or opposing passages leading toward one another to a point, so that the jets of gas issuing therefrom will impinge directly against one another. In this way the opposing currents tend to neutralize the excess of pressure; and an approximately constant pressure is thus obtained, and maintained at and beyond the junction of the opposing branches, notwithstanding the fact that the pressure from behind may vary to a considerable extent.

GAS-BURNER REGULATORS.—Nicholls, R., of London, and Kelley, J. F., of Tulse Hill, London. No. 19,005; Dec. 29, 1888. [6d.]

This regulator consists of a cap held upon the top of a support, and made with side holes for the exit of gas a certain distance below the top of the cap. The cap is covered in by a chamber, which screws on the support; the latter being connected to the main supply-pipe. The top of the chamber is formed with a neck internally screw-threaded for the burner; and under the burner are two layers of fine wire gauze with a layer of linen between. To prevent the linen being injured by the heat from the burner, it is dipped in a solution made of alum and gum-arabic dissolved in water. About twice as much gum as alum (by weight) is found to answer very well; and the solution may be further improved by the addition of a small quantity of chloride of sodium—say 10 per cent. by weight of the quantity of alum.

APPLICATIONS FOR LETTERS PATENT.

4644.—SIEMENS, F., "Improvements in regenerative gas furnaces and producers." March 16.

4679.—BOWEN, W. F., "Improvements in gas-engines." March 18.

4704.—GOODWIN, A., Jun., "Improvements in meters for measuring fluids." March 18.

4710.—OECHELHAEUSER, W. von, "Improvements in and relating to gas-engines." March 18.

4726.—GILSON, R. A., "Improved means of utilizing the waste heat of a gas-flame for warming purposes generally, and for increasing the luminosity of the flame." March 18.

4745.—SMYTH, J., "A new gas-regulator." March 19.

4776.—WRIGHT, W., "Improvements in or applicable to gas-burners." March 19.

4831.—GROC, A., and GREBEL, A., "Improvements in apparatus for regulating the supply of gas to gas-burners." March 19.

4842.—FOURNESS, W. A., "Improvements in regenerative gas-lamps." March 20.

4858.—GROSSMANN, J., "Improvements in apparatus for purifying coal gas." March 20.

4869.—IRVING, D., and COCHEY, A., "Improvements in apparatus for extracting ammonia, sulphur, &c., and other impurities from coal gas." March 20.

4969.—TARRINGTON, P., and M'DONALD, D., "Improvements in portable apparatus for manufacturing gas." March 21.

5011.—ATKINSON, J., "Improvements in ignition arrangements for gas-engines." March 22.

5067.—METHVEN, J., "Improvements in photometric apparatus." March 23.

5072.—SOUTHALL, J., "Improvements in gas or oil motor engines." March 23.

5108.—SOMERVILLE, J., and ALLAN, A., "An improved hydraulic main for gas manufacture." March 25.

5134.—TURNBULL, G. H., "Improvements in the trays or grids of gas-purifying apparatus." March 25.

5145.—DINSMORE, J. H. R., "Improvements in the manufacture of gas for illuminating and heating purposes, and in or connected with apparatus therefor." March 26.

5146.—JACKSON, J., "Improvements in or connected with gas-fired steam generators." March 26.

5154.—GUTZKOW, F., "Certain improvements in water-meters." March 26.

5181.—COSH, W. M., "Improvements in apparatus for the manufacture of illuminating or heating gases." March 26.

5183.—EMBLETON, D., "Improvements in gas motor engines." March 26.

5288.—MANOSCHEK, F. and R., "Improvements in gas-burners or lamps." March 27.

5354.—SEATON, T. L., "Improvements connected with apparatus employed for the purification and filtration of water and other liquids." March 28.

5355.—SEATON, T. L., "Improved means and arrangements of articulated appliances connected with the purification and filtration of water or other liquids." March 28.

5397.—NELSON, A. S. and M'MILLAN, J. G., "Improvements in gas motor engines." March 29.

5443.—TEIDEMAN, G., "Improvements in liquid-meters." March 29.

5463.—GREENALL, J., "Improvements in gas and mineral or other oil cooking-stoves." March 30.

5468.—FLOOD, S., "Moderating the draught of air for the combustion of gas issuing from the burner when using either a gas moon, globe, opal, saucer, or the like, named a 'Draught moderator.'" March 30.

THE ABOLITION OF THE DEPOSIT SYSTEM AT BOLTON.—At the meeting of the Bolton Town Council last Wednesday, Alderman Miles, Chairman of the Gas Committee, referring to the practical abolition of the deposit system, said that since the introduction of the new regulation they had attached service-pipes to upwards of 1300 cottages, which had not previously been supplied, and that at a time when the number of consumers usually decreased in view of the summer. He anticipated, therefore, a large increase of consumers next winter as the result of the abolition of the deposit system.

Correspondence.

[*We are not responsible for the opinions expressed by Correspondents.*]

GAS TESTING.

SIR,—In your article on "The Altered Instructions of the Gas Referees," you have made one slight error, with reference to the intervals between the testings, which you will perhaps allow me to point out. The Act of 1880, under which all testings in the Metropolis are carried out, distinctly provides that *no* tests are to be made except at intervals of one hour between each. Although hitherto omitted (I believe, by mistake) from the Gas Referees' Instructions, all Gas Examiners are, or ought to be, acquainted with the provisions of the Act. It can, therefore, be no hardship to them that they should be called upon to perform their duties strictly in accordance with those provisions. The altered Instructions have, in fact, not come a moment too soon.

You may not perhaps be aware that I conducted, on behalf of The Gaslight and Coke Company, on the 30th of January last, a lengthy "hearing," as provided by the Act, before the Chief Gas Examiner, with reference to two cases of alleged deficiency of illuminating power at the Grove Gardens and Hornsey Road stations. At this hearing the Gas Referees were present. Their altered Instructions are, to a certain extent, the outcome of evidence given, and suggestions made, on that occasion. The additions and alterations are important; but they do not, in the opinion of most of the authorities on gas-testing, go far enough. The Companies have more to complain of than the mere "system;" and it is with a laudable desire to lessen these complaints, and the growing feeling of dissatisfaction of all the Companies subject to the Act of 1880, that the Gas Referees have revised their Instructions.

The caution which you style in your article "peculiar," was shown by me at the hearing to be a most necessary addition to the Instructions. Gas Examiners have been in the habit of striking out, or not entering in their books, high readings, because in their opinion (and without any other reason) they showed too high an illuminating power; while, on the other hand, absurdly low readings have not invariably been treated in the same way. The Gas Referees are now evidently of opinion that no discretionary power should be left to the Examiners; and I think they are right.

M. F. MONIER-WILLIAMS.

6 & 7, *Great Tower Street, E.C., April* 3, 1889.

THE SUBSTITUTE FOR PHOTOMETRY.

SIR,—The writer of the article under the above heading asks, "Is photometry as applied to gas a discredited practice?" Surely he does not expect anyone who understands anything of the subject to say "No;" and why the Board of Trade refuse to assist to prepare the way for the deposition of the parliamentary standard candle from its present place in the land of gas-lights seems unaccountable—more especially after what was said by the Chairman of the South Metropolitan Gas Company (Mr. Livesey) at the last half-yearly meeting of that Company.

In speaking of the standard parliamentary candle, Mr. Livesey said: "It ought to burn 120 grains an hour; but it does not. It varies up and down. It has been proved to demonstration by officers of the Metropolitan Board and by others—by the Gas Referees, and by everyone who has investigated it—that, while one candle will give a certain amount of light, another will give a different amount; and that the same candle will vary in the amount of light given from time to time." Then he goes on to give a series of tests, made by the testers, showing the candles to be constantly varying; and as an instance, takes three of such tests, made one after the other. The first is 18·7, the next 17·1, and the third 16·1—a difference of 2·6 candles in these three tests; and he adds: "You can easily see, when we have such standards as this, that it is impossible for us to know where we are." Yet, in face of this, we are told by Mr. Livesey that at two of their testing-places—those at Southwark and Woolwich—they were summoned before the Magistrates for a deficiency of illuminating power.

It must be recollected that the South Metropolitan Gas Company have six testing-places; and that a test is made at every place every day in the year except Sundays. At four of these places the tests were above the requirements of the Act, on the very day that the tests of the other two were said to be too low. Now does any sane man think that the gas which circulates through the whole of their districts (the mains being all connected) could have been of unequal quality—in fact, that question is answered by the Company's own testings at those places, which gave 16·75 candles, against the tester's figures of 15·40; showing that the fault must have been in the candles, and not the gas. This was, of course, the view taken by the Magistrates, who reduced the penalty of 40s. to a nominal one of 10s.; and yet, in the face of this evidence, it is said that the Board of Trade refuse to assist to prepare the way for the deposition of the standard candle.

My object in writing on the subject is to make a suggestion to the Engineers of the London Gas Companies, to consider the question of the cost of the "Lux Gas-Balance," and the advisability of fixing one at each of their testing-places; so that, if approved by their respective Directors, steps might be taken to have them examined and tested daily by the official testers, when making their standard tests. Under their new "Instructions," I presume they would have ample time for such testings. It would be very interesting to note such testings at the various testing-places of the different Companies; and if the instruments are well made, it will certainly be proved that the gas is of the same quality at all the testing-places. It would, too, possibly be the means of showing the Board of Trade that there are more reliable means of testing the quality of gas than we have at present in the "standard candles."

MAGNUS OHREN.

April 4, 1889.

THE DINSMORE GAS PROCESS.

SIR,—Replying to the queries put by "Moredius" in your last issue, the apparatus in use at the Widnes Gas-Works for testing the illuminating power of the gas is an Evans photometer, made by Messrs. W. Sugg and Co., fitted with Sugg's standard "G" Argand burner, and his 2-candle standard. The same standard and burner are used for testing both the ordinary gas supplied to the town and the Dinsmore gas.

Corrections for temperature and pressure are always made. The average illuminating power of the Dinsmore gas for the last two months has been 22·13 candles. The average illuminating power of the gas supplied to the town during the same period has been 18·15 candles. The 2-candle standard is used to expedite testing operations. The candles, however, are always kept in readiness for anyone prefering their use.

Widnes, April 5, 1889. ISAAC CARR.

THE QUALITY OF GAS IN GASHOLDERS.

SIR,—If two different qualities of gas are put into a gasholder, so to speak, in layers, will they remain in that condition, or be delivered from the gasholder as one uniform quality? This is a point of some importance; and in order to arrive at some conclusion, I have recently made experiments, the results of which are given in the following table:—

Time.	Stock in Gasholders.	Quality (by Jet) of Gas put into Gasholder.	Quality (by Jet) Working Out.
	Cubic Feet.	Candles.	Candles.
Sunday— 6 a.m.	20,000	..	..
12 noon	387,000	12	..
10 p.m.	750,000	18½	..
11 „	..	..	18½
12 „	430,000	..	18½
Monday— 2 a.m.	..	..	18½
3 „	..	..	17
4 „	..	..	16½
5 „	312,000	..	..
12 noon	760,000	17⅝	..
Wednesday— (same week) 11 p.m.	760,000	..	17⅝*
11½ „	..	..	17
12 „	450,000	..	17
Thursday—1 a.m.	..	..	17
2 „	..	..	17
3 „	..	..	17
4 „	..	..	17
5 „	320,000	..	17
6 „	..	..	16½
6½ „	..	..	16½
7 „	20,000	..	16½

* Probably this test was from gas which had remained in the connections of the jet photometer.

When the inlet and outlet of a gasholder are close together, the gas goes in and out at the same time, and there is little doubt the same quality that enters also leaves the holder; but when the inlet and outlet are at opposite sides, the natural supposition would be that a certain amount of mixing had taken place. This, however, does not seem to be the case.

For the experiment, a holder was taken with 20,000 cubic feet of gas in it—nearly empty, in fact. Then 387,000 cubic feet of about 12-candle gas was put into it—the last remains of a Sunday morning's working. This was left in the holder till the evening, when 363,000 feet of about 18½-candle gas was added; making 750,000 cubic feet put in the holder. It was then worked out, when it was found that the good-quality gas which was in the lower part left the holder for four consecutive hours without any dilution from the poor gas. Before arriving at the dividing line between the two layers, it was found that a certain amount of mixing had taken place; and the quality, as delivered from the outlet, became lower. Some gas of higher quality was again put into the holder, and left in till Wednesday, when it was found that a better mixture had been effected; and it was nearly all of the same quality. At the works where these experiments were carried out, it is always the practice to have two or more outlets open at the same time, so that the quality as delivered to the district would be nearly uniform.

These experiments have been since repeated with similar results. I think that this clearly shows that two different qualities of gas put into a holder will require some little time before they become of one even quality throughout. There is wanting in fact something to stir up the mixture.

South Metropolitan Gas Company, FRANK LIVESEY.
709A, Old Kent Road, S.E., April 5, 1889.

THE OIL LIGHTING AT ERITH.

SIR,—I have read Mr. W. C. Defries's letter in your last issue, and fail to see that I am in any way responsible for his incompetence or obliquity to do a simple sum in addition:—90 + 104 + 98 = 292 lamps officially reported as not alight since he undertook to light the public lamps, from the end of July, 1888, to the date when the Chairman of the Erith Local Board reported the last 98 not alight. Surely he cannot be so blind as to impeach the veracity of the best friend he has had on the Local Board—the Chairman. I collated my figures from the printed reports of the Local Board's meetings in the two local newspapers. The proprietors of the papers have a reputation to maintain; are very outspoken and candid; and, although they are personally friendly to me, neither of them would have shed a tear on the Gas Company's account if this oil public lighting system had been a success during the time that the experiment has been tried. These newspaper reporters have recorded the facts, which I reiterate upon their authority—that 90 lamps were not alight during the first three months of the contract; that 104 lamps were acknowledged to be not alight during the nex tthree months; and when the cheque was drawn to pay the second instalment due, the Chairman further reported that 98 lamps were not alight during the three weeks following the expiration of the first six months of their contract. Wherein am I inaccurate? If I am in error, where is the error? Has not the number been *under-estimated* rather than overstated, as there has been no record of the number of "Smoky Doubtfuls" which are practically useless for giving light? I hold that oil public lighting is a fair subject for legitimate public criticism, and that I have in no way overstepped the bounds of *just and legitimate criticism.*

Gas companies have been regarded for many years, for some inscrutable reason, as fair game for every tyro at legislation on the local boards to have a shot at, notwithstanding the incontrovertible fact that gas has been one of the greatest blessings that has been enjoyed—in this country especially—since about the year 1824; and it is somewhat amusing to us, who have got accustomed to be "pitched into," that Mr. Defries should be so thin-skinned as to allow my really innocent banter to disturb the serenity of his mind. I am not antagonistic to Mr. Defries or to his system; in fact, if he and the oil companies would go into the dark benighted villages and towns unblessed with gas, every gas proprietor and official would say, "We wish you every success. How can we help you?" But if he and they will persist in competing with gas, they will find the gas companies, at any rate the West Kent Gas Company, hard to beat. With the experience of the past English winter, which has not been severe, we have no doubt about the result of the experiment at Erith in the long-run, if the oil company cannot do any better than it has done during its first seven months' trial.

Wimbledon, April 5, 1889. R. P. KEYS.

COUNTY AUTHORITIES AND THE USE OF THE STEAM-ROLLER.

SIR,—Your correspondent "Reganam," who writes in your issue of the 2nd inst., hardly gives sufficient information to enable his questions to be answered with certainty; but assuming that his gas-main was properly laid in the first instance, and in such a manner as to protect it from injury by ordinary traffic (as would appear to be the case), and assuming that he had a legal right to lay the main over the bridge, the county or other authority who have caused the roller to be used are, in our opinion, without any doubt, liable both for the damage to the pipes and the loss of gas. As we successfully conducted, on behalf of The Gaslight and Coke Company, the two great steam-roller actions against the Vestries of Kensington and St. George's, Hanover Square, we claim to know something of the law on the subject. If your correspondent likes to write to us direct, we shall be happy to give him any information in our power.

BEDFORD, MONIER-WILLIAMS, AND ROBINSON.

6 & 7, Great Tower Street, E.C., April 3, 1889.

WATER GAS.

SIR,—Along with most of my fellow-engineers, I have seen the remarkable report on "Water Gas" which has during the past week appeared prominently in the daily papers. This report does credit to the enterprise of its originators, and is another proof of the assimilation by Britishers of American ideas. This letter will merely concern the chemical and thermo-economic statements set forth in the report. *A priori*, I may say the remarks I have to make are offered in no hypercritical spirit, but are intended to clear away misconception, and arrive at a clear estimate of the value of what is popularly known as water gas—a misnomer that in one instance led to an amusing inquiry from a person in Algiers, who wrote me asking if I would provide him with means of making water gas, as, although there was no coal in the neighbourhood, there was an ample supply of water.

It is stated in the report that the useful effect in using solid fuel in ordinary circumstances is at the most 20 to 25 per cent.; but with gas, 90 per cent. of useful efficiency can be attained. Now, if we take the normal and actual calorimetric value to be equivalent to an evaporation of 14 lbs. of water to 1 lb. of fuel, the ordinary efficiency of solid fuel firing systems is as follows:—

$$\frac{7 \times 100}{14} = 50 \text{ per cent.}$$

The net possible useful efficiency of gas firing, after allowing for the heat required to raise the waste gases up the chimney (a thermo-dynamic work that cannot be neglected in calculations), is then—

$$\frac{10{\cdot}5 \times 100}{14} = 75 \text{ per cent.}$$

With water gas it is theoretically impossible, without condensation of products of the oxidation of the hydrogen and the recovery of the heat held latent by the aqueous vapour (H_2O), to obtain more than 72 per cent. of efficiency.

The report states that the flame of water gas has a temperature equivalent to 5112° Fahr., and that the flame of ordinary coal gas has a temperature of 2430° only. The thermic value of equal volumes of different combustible gases is more correctly given as follows:—

	Units.
Water gas	2813
Coal gas	5511
Generator gas	1470

In the table accompanying the report giving the units of heat of different gases, it is represented that when the reactions evolving water gas are produced, 27,440,000 units of heat are contained in the gas produced from a ton of fuel; but when producer gas is used, only 17,920,000 units are held by the gas. Now, were this latter statement correct, it would prevent, on economic grounds, the application of this gas at all. Assuming that one ton of coal has a calorific value of 32,000,000 units, if this gas is converted into a gaseous condition by semi-combustion, the gas evolved possesses thermo-chemically, and as sensible heat, the whole of the heat possessed by the coal, less that lost by radiation and convection and that absorbed by chemical reactions. In a gas-producer, in which air *per se* is the agent of oxidation, the nitrogen, introduced by air, carries with it in a sensible form, the heat resulting from semi-combustion, or the oxidation of the carbon to CO. The heat sensibly attached to the nitrogen is not lost, and can, to a greater degree than if the heat were latent as in steam, be recovered, unless the latter or steam were condensed; but for all ordinary arrangements of combustion this is impracticable.

The report represents the heat-value of ordinary coal gas per ton of fuel as equal to 6,720,000 units. If we divide this figure by the number of cubic feet of gas it represents, or 10,000, then 6,720,000 ÷ 10,000 = 67·20; or 67·20 equals the number of heat-units of one cubic foot of ordinary coal gas. We will compare this with the other values given in the tables. The value of the water gas is stated as equal to 11,760,000 units. This divided by 35,000, the number of cubic feet it represents, gives as the value of one cubic foot 33·60 units, or exactly half the thermic value of coal gas. It is only fair to add that besides the 10,000 cubic feet of gas given off in the closed-retort practice, there is

the residual coke, which possesses *inter se* the balance of the units, less that carried off in the form of tar.

In the report, the absence of nitrogen in water gas is made a strong argument in its favour. This characteristic is in some applications a great advantage; but in making a comparison between the heat of combustion carried off as sensible heat by the products of combustion between ordinary producer and water gas, we should not forget that there is a considerable loss due to the heat absorbed and rendered latent by the steam resulting from the reoxidation of the hydrogen. We shall see that this loss is of considerable value, and it more than balances that debited to the nitrogen in producer gas.

Taking the reaction represented by

$$C + H_2O = CO + H_2$$

to produce water gas, and its complete combustion to be represented by

$$CO + H_2 + 2\,O + 8\,N = CO_2 + H_2O + 8\,N,$$

and acknowledging producer gas to be evolved according to the following sequence of reactions.*

$$2\,N_4O + C = 8\,N + CO_2, \text{ and } 8\,N + CO_2 + C = 8\,N + 2\,CO,$$

then the combustion would be effected as follows:—

$$8\,N + 2\,CO + 2\,O + 4\,N = 12\,N + 2\,CO_2.$$

Assuming that in each case, as an example, 12 grammes of carbon are employed, and are used first to produce water gas, and that afterwards the same weight is used to produce carbonic oxide, and assuming that both kinds of gas are consumed, and their products of combustion are allowed to escape at a chimney temperature of 500° C., then—

$$500\left(\underset{[12+32\times0{\cdot}217]}{CO_2} + \underset{[2+16\times0{\cdot}481]}{H_2O} + \underset{[112\times0{\cdot}244]}{N}\right)$$

$$= 22{,}767 \text{ units of sensible heat.}$$

$$18\times606{\cdot}5 = 10{,}917 \text{ latent heat of steam.}$$

$$33{,}684 \text{ units lost.}$$

Now, taking the combustion of producer gas for the same weight of fuel, then—

$$500\left(\underset{[12+32\times0{\cdot}217]}{CO^2} + \underset{[84\times0{\cdot}244]}{N}\right) = 15{\cdot}122 \text{ units lost as sensible heat.}$$

The ratio of heat-units lost to the total units produced by the combustion of the two gases will be as follows:—

Water Gas.

	Units.
28 grammes CO to CO_2 =	67,284
2 „ H to H_2O =	57,924
	125,208

The ratio of loss will therefore be $\frac{33{,}684 \times 100}{125{,}208} = 25$ p. ct.

Producer Gas.

	Units.
28 grammes CO to CO_2 =	67,284

The ratio of loss will therefore be $\frac{15{,}122 \times 100}{67{,}284} = 22{\cdot}4$ p. ct.

Hence we see the advantage is slightly in favour of producer gas. The real advantages possessed by water gas as a fuel, in comparison with producer gas, may be estimated as follows:—It contains in a given volume a greater calorific value, so that in its application there is a less proportion of the heat lost by radiation. Whether combustion is produced for thermo-dynamic or purely heating purposes, the greater the periodic rate of its production and transmission for useful effect, the less the loss by radiation; and, as I have already pointed out, the greater the piston speed of a motor, the less the heat lost by jacket or cylinder side radiation. The same law holds good in a greater degree in furnace work. Here the internal chamber, having a possible heat of (say) 2000° C., is only divided from the atmospheric air by a refractory wall, the inner side of which is at or near the combustion temperature of steel melting, and the outer side at the temperature of the atmosphere. Hence the importance of accelerating such a high-temperature process as much as possible; and the more concentrated thermic character of water gas is a decided advantage, and one that I have long recognized. Another advantage that I have always insisted on, is the fact that water gas is comparatively free from sulphur compounds. Metallurgists will recognize the value of this feature. For steam-raising processes, the fact of a boiler being in a sense a calorimeter, with its combustion-flues surrounded with water, reduces the loss by radiation to an insignificant degree; and the non-luminous character of the water gas, and the fact just mentioned, preclude the economic application of water gas for this purpose. But for all purposes where concentration of calorific effect is a *desideratum*, there is an adequate *raison d'être* for the application of water gas. I have already (see *Engineering*, Jan. 15, 1886) shown its deoxidizing or reducing value.

B. H. Thwaite.

Liverpool, April 2, 1889.

* For facility of calculation, N_4 is taken instead of $N_{3\cdot5}$.

WATER BY MEASURE.

Sir,—"Positive," writing on "Water by Measure" in this week's Journal, repeats, and endeavours to enforce, some of the well-known arguments usually employed by those who are opposed to the system of charging for water by meter. But, if these have no greater weight than another argument used by him, to which I desire to call attention, there will be little cause for dismay among those who, differing from "Positive," are favourable to the use of water-meters, and advocate its extension.

Commenting on some remarks in favour of water-meters which were read before the American Society of Civil Engineers, in September last, "Positive" writes:

"Again, it is stated that 'no inquisitorial examination of premises, so unpleasant to consumers, is required.'" Neither is such examination made under the present system, only when a leak or waste is *known* to exist; and after long experience, I find both the owner and tenant are grateful for having the defects pointed out, and usually set about the repairs promptly, that the owner may not suffer injury to his property, nor the tenant be annoyed, by damp, or defective apparatus. This would not be the case if the tenant were supplied by meter. He naturally is desirous of paying, as per gas-meter (which he disputes regularly), about the same sum every quarter; *but perhaps there has been a very minute leak underground, and his bill amounts to six times his usual charge—for a hole in a pipe 0·060 inch, under a pressure of 50 lbs. per square inch, will run the consumer into an extra charge for* 18,000 *gallons per quarter.* Water at present is supplied for trade purposes by meter; and those who have the inspection and care of meters know too well that the consumer will not consent to pay his bill if it is a little over the usual amount. The Company have to bear all expenses and losses, or be always in Court; and the readers of the Journal are kept well-informed of the treatment doled out to water companies by the ruling magnates."

The italics in the above passage are mine; and it is with the words so emphasized that I propose to deal.

I therefore ask—Why should a consumer be made to pay for the waste caused by a "leak underground," or before the water has been delivered to him within the building? What would be thought, and said, of a gas company who placed their meter some distance from the house of a consumer and charged him for leakage in their service-pipe leading to it.

"Positive" is thinking of "high-pressure" meters, and of these alone; for it is only to the practice in regard to them that such remarks can apply. Had "Positive" remembered that there are such things as "low-pressure" meters, and that your own columns have recently shown that there is at least one low-pressure meter that may be relied upon, he would have hesitated before employing such an exploded argument as the one quoted from his article. But I suppose "Positive," like others who think with him, is possessed with the notion that low-pressure meters cannot be used because they deprive the water of its pressure at the moment of delivery. "Positive" should remember that *that is just what cisterns do;* and that, unless he is prepared to advocate the abolition of cisterns, he ought not to object to low-pressure meters.

Of course, I am not forgetting the fact that "Positive" is opposed to water-meters altogether. But, in stating his views, he has employed at least one argument which calls up the question of comparative merit not only as between "high" and "low" pressure meters respectively, but as between individual meters of both classes. It is this that has caused me to notice his article.

Low Pressure.

April 4, 1889.

Parliamentary Intelligence.

HOUSE OF LORDS.

During the past week the following progress with Private Bills was made:—

Bill read the first time: London Hydraulic Power Company Bill.
Bill reported: Plymouth Dock (Devonport) Water Bill.
Bills read the third time, and passed: Newcastle and Gateshead Water Bill, Padiham and Hapton Local Board Bill, Wakefield Corporation Bill.

HOUSE OF COMMONS.

Thursday, April 2.

GAS UNDERTAKINGS (UNITED KINGDOM).

Returns were ordered of all authorized gas undertakings in the United Kingdom—in the case of those belonging to companies, for the year ending Dec. 31, 1888; and in the case of those in the hands of local authorities, for the year ending March 25, 1889.

During the past week the following progress with Private Bills was made:—

Bills read the first time: Belgrano (Buenos Ayres) Gas Company Bill, Deanhead Commissioners' Bill, Newcastle and Gateshead Water Bill, Padiham and Hapton Local Board Bill.
Bill read a second time: Hythe Corporation Bill.
Bills reported: Kettering Water Bill, West Ham Gas Bill.
Bill read the third time, and passed: London Hydraulic Power Company Bill.

Exmouth Gas Company.—The annual general meeting of this Company was held on the 27th ult.—Mr. J. F. Sloman in the chair. The report presented showed that, although a reduction of 3d. per 1000 cubic feet had been made in the price of gas, the profits of the Company had not suffered, great economy having been effected. During the past year extensive alterations were made in the Company's works. The financial position of the concern was most satisfactory; there being a balance of £1335 15s. available for dividend. The Directors were able to recommend a dividend (free of income-tax) of 10 per cent. on the "A" capital and 7 per cent. on the "B" and "C" capital, which would still leave a balance of £730 15s. to be carried forward. The report was adopted. Mr. Cox moved a vote of thanks to the Directors which was seconded by Mr. Padfield, and carried unanimously; as was also a hearty vote of thanks to Mr. J. T. Foster, the Secretary, and Mr. J. D. James, the Manager. As a proof of the excellence of the management, it may be mentioned that maximum dividends have been declared on all the capital, and a substantial balance carried forward.

Birmingham Corporation and Gas-Fitting.—A meeting of Birmingham gas-fitters was held last Wednesday, to receive a report from the Committee appointed at a previous meeting (*ante* p. 542). The Chairman (Mr. G. Hadley) said the Committee had an interview with the Corporation Gas Sub-Committee on the 23rd ult., when they were treated in a courteous manner; and a promise was given that the matter of which they complained would be brought before the Council at their meeting in May. The deputation asked Mr. Edwin Smith and the members of the Gas Committee whether they knew of any other Corporation that engaged in trade; and they could not name one. This fact showed that the gas-fitters had a strong case, and that the presumption was that the department was wrong, and that they were in the right. It was also urged upon the Gas Committee that gas-fitters were now subjected to an unnecessary hardship—viz., that whenever a gas-fitter obtained a contract, he had to be responsible, and not the tenant, for the cost of connecting the meter and laying the service, although the Corporation did the work. The Gas Committee asked the deputation if any of its members had had explosions. They were able to reply in the negative. The deputation pointed out that the ratepayers generally had not been benefited by the department, though it had injured, and still did injure a section of the ratepayers. A favourable impression seemed to be made upon the Committee; and a request was made that the matter should be fairly reported to the Council, inasmuch as the deputation believed the trade was strong enough in the Council to carry out its views. Members of the Council to whom he had spoken all agreed that Corporation trading was bad in principle. When the memorial came before the City Council, Mr. Lowe would champion their cause; and there was good reason to hope that it would be carried to a successful issue. Several of those present addressed the meeting, which concluded with a vote of thanks to the Committee for the energy displayed since their appointment.

Legal Intelligence.

CLERKENWELL POLICE COURT.—Tuesday, March 19.
(*Before Mr.* J. R. W. Bros.)

METROPOLITAN BOARD OF WORKS *v.* THE GASLIGHT AND COKE COMPANY.
CONVICTION FOR DEFICIENT ILLUMINATING POWER OF GAS.

This was a summons by the Metropolitan Board of Works to recover a penalty incurred by The Gaslight and Coke Company for supplying gas deficient in illuminating power at the Hornsey Road Testing-Station.

Mr. Roberts appeared for the Metropolitan Board; Mr. Besley (instructed by Messrs. Bedford, Monier-Williams, and Robinson, of 6 and 7, Great Tower Street, E.C.), for the Company.

Mr. Roberts said the summons was taken out under the defendants' Act of 1876 and the General Act of 1860. Having cited the sections of these Acts affecting the question, he went on to say that the forfeiture alleged to have been incurred here was 40s.—that was to say, the deficiency in illuminating power must be considered as that of ½ candle; roughly, it was 0·7 candle.

Mr. Besley: Was it not 0·6?

Mr. Roberts: It is 15·3 candles.

Mr. Besley: The reading which the Company put upon the matter is this: That when the return is 15·5, as 10 makes up the candle, 15·5 would show a defect of less than ½ candle. Therefore up to 15·5 there is no penalty.

Mr. Roberts remarked that he did not agree with Mr. Besley's view.

Mr. Besley said it was distinctly laid down that the Company should not be liable to a forfeiture for the first ½ candle deficiency. Until the ½ candle was exceeded, therefore, there could be no penalty.

Mr. Roberts maintained that if there was a deficiency of ½ candle, the penalty applied.

Mr. Bros inquired whether this was the point in the case.

Mr. Roberts replied that it did not apply here; because the illuminating power of the gas was 15·3 candles.

Mr. Besley said it was an important matter when his Worship came to consider this point. His Worship would have to consider two things—one being whether, under the Summary Jurisdiction Act of 1879, it was so trivial a matter that he ought to dismiss the summons; and the other was whether, under the Act of 1884, he, having power to mitigate all penalties, should reduce it to 5s., as Mr. Vaughan at Bow Street did on one occasion. The Company laid great stress upon this point—that ½ candle was allowed for general inaccuracy. When his Worship heard the mode of testing the gas, and the difficulties attending it, he would see the reason of this margin being granted. For the first ½ candle there should be no penalty; but directly the ½ candle was exceeded, they became liable to a penalty for the ½ candle which had become deficient before. There was no doubt that if 15·3 candles was the correct illuminating power of the gas, this was more than ½ candle.

Mr. Roberts (continuing) said, on the point to which Mr. Besley last referred, it might be interesting to his Worship to know that, taking ½ candle defective illuminating power on the whole of the gas supplied to London, would represent something like £100,000 a year; so that it was a matter of importance to the public. Although it was coming very close to the limit of forfeiture, still it was a very serious matter if regarded from all sides. Calling attention to the section of the Act which says "the report of the Chief Gas Examiner on appeal . . . . shall be conclusive evidence of the liability of the Company," he observed that this was originally assumed to mean that the controlling authority could come to the Court, prove the report, and have a distress warrant issued; but, of course, this was not in accordance with the general practice of the Courts.

Mr. Besley said the contention put forward, and with some success, was that the report of the Chief Gas Examiner was necessary before they could get their summons; but the accused persons had no right to defend themselves.

Mr. Roberts said what he suggested was this—that it was clear, from the special wording of the Acts, that the intention was to provide a scientific authority as an appellate authority where any dispute arose; and he took it that all technical matters arising on the merits, as to the accuracy of the testings or the returns, were to be settled by him; and his decision, as the Act said, was to be considered final and conclusive evidence of liability. In the present case, the Gas Examiner at the Hornsey Road station, on Oct. 18 last year made a return of the average illuminating power of the gas supplied at the station as 15·3 candles. This showed a deficiency of 0·7 candle. The Company appealed against this return; and Professor Williamson, the Chief Gas Examiner, held an inquiry, with regard to which he made a report on the 23rd of February last.

Mr. Besley said a point would arise here on which he should have to give evidence—viz., that the Chief Gas Examiner refused to accept evidence which the Company were ready to give him, and said that, the person who made the test being a Gas Examiner, it was not competent for the Company to show that the gas supplied on the day in question at the other testing-stations had been officially reported as being above 16-candle power.

Mr. Roberts then read the report of the Chief Gas Examiner, which was as follows:—

I have the honour to report that The Gaslight and Coke Company appealed against the reports of deficient illuminating power at the Grove Gardens Testing-Station, on the 17th of October, and on the 5th of November; also against the report of deficient illuminating power at the Hornsey Road Testing-Station. The Gas Examiner at the Grove Gardens Testing-Station had reported that the illuminating power of the gas supplied by the Company at the station was equal to 15·5 candles on the 17th of October, and that it was equal to 15·4 candles on the 5th of November. The Gas Examiner at the Hornsey Road Testing-Station reported that the gas delivered by the Company at the station on the 18th of October was equal to 15·3 candles. The Company's appeals against each of these reports reached me within seven days after the day on which such report was delivered to the Company. The Company's Solicitor furnished me, on their behalf, with a written statement of the chief points which he wished to bring forward in support of the appeal; and, at my request, was good enough to send a copy of the statement to the Clerk of the Metropolitan Board. A counter-statement was furnished to me, and at the same time to the Solicitor of the Company, by the Superintending Gas Examiner of the Board.

At the request of the Company, who wished to have an opportunity of putting questions to some of the officers of the Board, and for other purposes, I appointed a joint hearing of the two parties, at which the Solicitor of the Company conducted the case for the Company, whilst the Superintending Gas Examiner of the Board and the Gas Examiner were also present. It appeared from the evidence of the Gas Examiner, and of the Superintending Gas Examiner, that the tests were performed with sperm candles, as prescribed by the Act, and were in strict accordance with the Instructions of the Referees. It was, however, urged on behalf of the Company, that the candles in use on various occasions previous to the dates of the impugned reports had apparently been unsatisfactory, and that the candles used on the days when the low returns were made may possibly have been equally uncertain, and ought, in fairness to the Company, to be disregarded. In evidence of the statement, it was shown that on various occasions official tests made at the Grove Gardens station had been cancelled by the Gas Examiner in the book in which they had been entered; and it was explained by the Gas Examiner that, although he had no recollection of the precise circumstances in these cases (which occurred some time ago), he could affirm that when he thus cancelled a test, there must have been, in his opinion at the time, something wrong in it. Such entries of very high readings, subsequently cancelled, did not occur on any days of the reports appealed against; and the Gas Examiner asserted that whenever cases of low readings presented themselves, he took particular care to avoid any error. I see no reason to doubt this assertion. It is well known that when a standard candle is allowed to burn with a long wick and smoky flame, it gives considerably less light than when burning "properly," and accordingly raises the apparent illuminating power of the gas.

A technical objection to the tests was raised by the Solicitor of the Company, on the score of a bias which, in his opinion, might have been produced in the minds of the Gas Examiners by a circumstance which was not mentioned in the Gas Act or in the Instructions of the Gas Referees. It appears that the Gas Examiners have, "from time immemorial," been in the habit of observing the height of the flame of the gas which they were about to test in the photometer, and to make a guess at its height in inches. From the height of the flame, they formed a rough estimate of the illuminating power of the gas. Latterly they have been supplied with glass chimneys, as prescribed by the Gas Referees for use in the photometers, but having three or four fine lines marked across them at one side——

Mr. Besley (interrupting): Allow me to accentuate that—that the chimneys have three or four lines marked across them on one side. I shall show you that those chimneys are no test, because the Examiners did not use the chimneys prescribed.

Mr. Roberts said his friend was rather anticipating. Here was the scientific authority dealing with this matter [proceeding with the reading of the report]:

These fine lines serve to mark off the lower part of the chimney in inches and half inches; and the Examiner measures, by the aid of them, the height of the flame burning inside the chimney. It appears that no instructions have been issued to the Gas Examiner to use these graduations, and that the presence of these lines on the glass chimney cannot affect the use of the chimney in the photometrical tests, inasmuch as the rays of light which undergo measurement do not pass through that part of the chimney on which the lines are marked. It is most emphatically asserted by the Superintending Gas Examiner, and by the Gas Examiners, that the official tests subsequently made with the photometer are accurately recorded as observed, whatever may have been the preliminary indication afforded by the height of the flame. The Superintending Gas Examiner states that the Gas Referees have seen these glasses, and have raised no objection to them whatever. It appears that such measurements of the height of the flame have been recorded in the book in which the Gas Examiners enter the observations made in their official tests, but that they have not been mentioned in any official reports made by the Gas Examiners.

It is a very common-place practice, among those who have to make accurate observations of physical phenomena, to get in the first instance some rough approximation to the result by some different process than that which gives the most accurate results; and experience shows that it is of advantage to do so. The Gas Referees lay down with accuracy the mode of proceeding in the official tests; but they leave various matters—such as making the candles burn properly, &c.—to the discretion of the Gas Examiners. It cannot, therefore, be held that the Gas Examiners are debarred from making these preliminary observations by the fact that they are not expressly authorized by the Referees, and there does not seem to me to be sufficient ground for believing that they would prejudice the official reports. I think, however, that it would be desirable to abstain from making any entry of the height of the flame in the books which record the official observations.

In the written statement sent me on behalf of the Company, it is urged that the gas tested at Grove Gardens was made at the Beckton works of the Company, that it was tested by officers of the Company before leaving the works, at various points after leaving them, and found to be of due illuminating power; also that the same gas was tested at several testing-stations, and found to be of more than 16 candles illuminating power, and it is argued that there must have been some local cause—such as an accumulation of naphthalene or the like, or in connection with the instruments or candles—for the deficient illuminating power of the gas at the testing-station, which, however, the Company does not admit. In support of the idea that an accumulation may have taken place in the pipe with the effect of weakening the gas, it is stated that unusually cold weather for the season prevailed during the week preceding the test on the 17th of October, and that something like ten times the usual number of cases of naphthalene in their service-pipes was reported to the Company; also that the Grove Gardens Testing-Station is so circumstanced as to be peculiarly subject to the influence of cold. On the other hand, it is stated that endeavours made on behalf of the Company to discover naphthalene after the 17th of October in the service-pipes, failed to give any evidence of the presence of that body.

The tests performed by the officers of the Company, however accurate and trustworthy they may be, and however useful to the Company as indicating any variation in the quality of the gas at the works, or any change which the gas may undergo in the process of distribution, are not allowed by the Act to be taken as evidence of the illuminating power of the gas. We find in the Gas Act, clause 8: "The average of all the testings at any testing-place on each day of the illuminating power of the gas supplied by the Company at such testing-place shall be assumed to represent the illuminating power of such gas on that day at such testing-place." And again, in clause 14: "If on any day the gas supplied by the Company at any testing-place is of less illuminating power than it ought to be under the Special Act, the Company shall be liable to the following forfeitures." It is evident from these clauses that even several favourable tests at other testing-stations cannot cancel an official report of insufficient illuminating power from one station. The Act requires that the Company shall supply gas of a proper illuminating power at each one of the official testing-stations. They have, accordingly, not only to make good gas, but to protect it on its passage to each station from any influence which might injure its quality. It is presumed that, if they find out and adopt the precautions which are requisite for conveying the gas uninjured to each testing-station, they will apply those precautions to the gas which they deliver to the public.

Forfeitures for insufficient illuminating power of gas supplied by a Company may thus, under the Act, be incurred in cases where the Company make good gas, but fail to protect it from an influence which weakens its quality before it reaches the station; and in fairness to the Companies this fact ought to be known to the public. It ought not, moreover, to be forgotten that standard candles even when "properly" burned are liable to vary to the extent of 10 per cent. of their value. Candles which happen to be unfavourable to the Company may thus bring them within the limits of forfeiture; whilst in other cases candles burning low may save them from forfeiture, by making their gas appear better than it is.

It is stated, on behalf of the Company, that the remarks made in support of their appeal against the report from Grove Gardens on the 17th of October, apply to a great extent to the low return from that station on the 5th of November, "although the previous returns for naphthalene were considerably lower."

With respect to the report from the Hornsey Road station, it is stated that the gas which supplies that station is made at the Bromley works, and that the Devon's Road Testing-Station is supplied from the same main as the Hornsey Road station; yet the return from the former showed higher illuminating power than the return from the latter to the extent of 1·6 candles. Numerous testings by the officers of the Company of what is stated to be the same gas, are quoted in confirmation of the plea that there must have been some special reason for the low readings at Hornsey Road.

Upon the evidence adduced by the Gas Examiner, and by the Superintending Gas Examiner, I am satisfied that the tests against which the three appeals are made were duly carried out in accordance with the provisions of the Special Act and the Instructions of the Gas Referees. I do not consider that the Company has succeeded in proving that the defect of illuminating power in any one of these cases was occasioned by an unavoidable cause or accident."

This report (continued Mr. Roberts) practically disclosed the case for the controlling authority in seeking to recover the forfeiture which the Company had incurred. As to the Magistrate's power of mitigating the forfeiture, that was for his Worship to deal with, and not for him (Mr. Roberts) to comment upon; but he pointed out that the fourth section of the Summary Jurisdiction Act limited the power of mitigation to cases of first offence.

Mr. Bros: You say the Company is an old offender.

Mr. Roberts said Mr. Besley himself had stated that Mr. Vaughan

imposed a penalty of 5s. on the Company. No prosecution had taken place with regard to Hornsey Road; but the Company did not come into Court with clean hands.

Mr. BESLEY: That is to say, that in 29 years they have been convicted in a sum of about 25s.

Mr. ROBERTS remarked that as the law stood every step that the law allowed the Company to take had been taken; and in the result the appeal had gone against them.

Mr. BESLEY pointed out that the Chief Gas Examiner expressly omitted to say that the gas supplied was less than the statutory illuminating power. All he said was that, upon the appeals, the tests were duly carried out in accordance with the Referees' Instructions, and that he did not consider the Company had succeeded in proving that the defect of illuminating power in any one of these cases was occasioned by an avoidable cause or accident. He did not say there was a defect.

Mr. ROBERTS contended that the report clearly pointed to the fact that the return was correct, and therefore the forfeiture was incurred.

Mr. *R. Grimwood* was then called, and, in reply to Mr. ROBERTS, said he had held the appointment of Gas Examiner under the Metropolitan Board since May, 1870. His experience as a gas tester extended over a period of nearly 28 years. On Oct. 18 he was acting as testing official at the Hornsey Road Testing-Station; and the mean illuminating power of the gas was 15·3 candles—being a deficiency of 0·7 candle. The return was sent to the several authorities; and on Jan. 30 he appeared before the Chief Gas Examiner on the hearing of an appeal by the Gas Company against the return.

Cross-examined by Mr. BESLEY: He commenced an experiment at 7 o'clock on the evening in question.

Mr. ROBERTS said he ought here to ask how far the learned Counsel was entitled to go into the merits of the case at this stage.

Mr. BROS: I may say I do not consider I can go behind the result of the appeal on the inquiry.

Mr. BESLEY said he should, of course, at once submit to the ruling. First of all, he should say there was no legal test by law, because the test was by Act of Parliament upon the Notification of the Gas Referees. Therefore if the law had been violated as to the test, there had been no test. The next contention he should urge was that with regard to the appeal. The Chief Gas Examiner excluded evidence tendered to him to show that there must have been either inaccuracy or accident, because the gas on the day in question from the same place of manufacture was above 16-candle power, and that afterwards on successive days, when there was another Gas Examiner at this place, when the Company had a man standing beside him, and seeing him carrying out the test, it was never under 16 candles. It was a most material matter to show that this was a frivolous prosecution with regard to something which he said was inaccurate. Of course, it was only with regard to the question whether his Worship would dismiss the summons as frivolous, or impose a nominal penalty, that, under the ruling, he was entitled to cross-examine.

Mr. BROS: I have expressed my view that the appeal from the Chief Gas Examiner is an appeal which is not appellable.

Mr. BESLEY said he accepted that expression of opinion, because Mr. Vaughan took the same view when he allowed the cross-examination to proceed; and he said afterwards that, although he felt bound by the testing, if he had not been so bound, he would not have fined the Company a farthing. He (Mr. Besley) confessed he did not understand these prosecutions; and he would try to get at the bottom of them.

Cross-examination resumed: It was a fact that he made the observations, according to the Notification of the Gas Referees, every ten minutes. He put down in his book "flame 2¼;" that was after the second test. On the day in question he made three tests, and therefore 30 single minute observations. The result of the first ten observations was 15·3 candles; of the second ten, 15·3 candles; and of the third ten, 15·85 candles.

Mr. BESLEY: Inasmuch as you are required over the whole of each day to take a number of tests, and take the aggregate during the whole of the day for the tests, what right had you to take your testings between 7 and 10 o'clock at night?

Witness: I have always done so.

Cross-examination continued: The candles had sometimes to be discarded on account of the wicks being defective. A "Tower" photometer was used at Hornsey Road.

Mr. BESLEY: Has this photometer been declared to be an untrustworthy instrument?

Mr. ROBERTS: If you go into this, where will it end? I can bring evidence if we are going into the collaterals.

Mr. BESLEY: It will end in exposing Mr. Dibdin; that is what it will end in.

Mr. BROS: There ought to be some other way of exposing him than in this Court, because this is merely a summons for a penalty.

Mr. BESLEY: With regard to a penalty, there are such things as the opinion of a Magistrate weighing with a public body sometimes. The idea of their going for a penalty in a matter such as this is a proceeding I will not characterize. [To witness:] Is it a fact that from Oct. 1 to 25 you were the person testing at the Hornsey Road testing-place?

Witness: Yes.

You admit that your returns were (I am reading for every day, omitting Sunday, Oct. 7) 16, 16, 16·6, 16·4, 16·4, 16·3, 16·2, 16·4, 16·4, 16·1, 16·3, 16, 16, 15·8, 15·9, next the 15·3, and then 16, 16, 16·4, 16·3, 16·4, and 16·3.—If the figures were taken from the test book, they were mine.

Cross-examination continued: An Examiner of the name of Wade was put on at this station on Oct. 26; but witness did not know that he immediately returned the gas as of 17·1-candle power; nor that during the whole time Mr. Wade was there, there was not a single instance of the gas being below 16 candles. He was not a member of The Gas Institute; nor had he heard the statement of Mr. Dibdin's as to the perfect unreliability of the "Tower" photometer.

This concluded the case for the prosecution.

Mr. BROS observed that he might say at once that all he had to do was to decide whether a penalty had been incurred; and he should take the Chief Gas Examiner's report as final. Did Mr. Besley contradict the 15·3 candles?

Mr. BESLEY said he was going to tender evidence. If it was excluded, it might well be a question for the High Court to decide. He was going to tender evidence to show that this was a frivolous prosecution, and that it was not true that gas was sent out of less than 16-candle power. If he not only proved this, but showed that the system at present existing was untrustworthy, and that even what it was had been violated by the Gas Examiner, and if he further proved that there had been no true test according to law, the Company would surely not be fined in a case of this kind.

Mr. BROS: I consider I am bound by the report of the Chief Gas Examiner. The fine is only 40s.

Mr. BESLEY said he objected to a fine of a penny. It was a very important principle. They had heard a statement that day that by sending out gas of a lower quality than they should supply, they could make an extra profit of £100,000.

Mr. ROBERTS: I said on the gas supplied in London.

Mr. BESLEY said that was assuming that all the gas sent out on every day in the year was of less power than 16 candles. However, he should address his Worship on the subject, and should have to call witnesses. Therefore, he suggested that they should not proceed farther that day.

After some discussion, the case was adjourned until the 1st inst.

MONDAY, APRIL 1.

On the resumption of the case to-day,

Mr. BESLEY said he did not propose to address his Worship to question his ruling, or to travel outside that ruling, except to point out that if it was his opinion that the matter was worthy of discussion in the High Court, he should ask to have the points noted that he should make—viz., that in this case the appeal to the Chief Gas Examiner was no appeal at all; that therefore there was no valid determination of the scientific question, inasmuch as he refused to hear evidence. In his judgment, the system of hearing appeals which had prevailed was a most pernicious one. The custom dated from 1866, when gas of 16-candle illuminating power was made the statutory requirement. It had been usual for the Chief Gas Examiner to have written statements from each party when a return was appealed against. No evidence was called, no appointment was made, and no hearing followed. Of course, the practice, which was very much to be deprecated, would come to an end, because the Gas Companies, owing to the position which had been taken up now, would be careful that the Act of Parliament as long as it existed on the Statute-Book should be properly administered. In this case there was a perpetuation of the abominable system of sending in papers; and there was a partial hearing. Getting away from the Chief Gas Examiner, they had a body of persons who were, of course, the creatures of the Metropolitan Board of Works. They were appointed by them; and they were paid by them. It was a strange thing that from 1876 down to last year, the times when the supplies of gas of an alleged lower illuminating power than 16 candles was the subject of an inquiry before a Magistrate might have been counted upon the fingers of one hand. This, as he had said, was a frivolous prosecution. The Gaslight and Coke Company manufactured and distributed to the public 80 million cubic feet of gas every 24 hours; and their motive was to take care that no gas should leave their works of less than 16-candle illuminating power. For years no complaint was made against the Company; and then from Oct. 1 to 25 of last year, Mr. Grimwood tested at the Hornsey Road station, during which time there was only one day on which there was a fineable or alleged deficiency in the illuminating power of the gas. On Nov. 13 last the following letter was sent to the Company from the Metropolitan Board of Works:—

Sir,—The Special Purposes and Sanitary Committee have had under consideration your letter of the 20th ult. on the subject of the official testing of the gas of your Company; and I was directed to point out, with reference to your statement that the Board's testing officers are "not supplied with testing candles of any one maker," that the Gas Examiners are supplied with, and instructed to use nightly, different candles of different makers, and that this is done at the special request of the representatives of one of the Gas Companies. As to your statement (this, said the learned Counsel, was the most important passage) that the mode of manipulating the candles is not identically the same, I am to point out that such manipulation is, as a matter of fact, practically identical at all the testing-places under the charge of the Board. With your statement that the testings often show contradictory results, and convey an inaccurate representation of the quality of the Company's gas, the Committee agree, as it confirms their experience of the wholly unsatisfactory character of the candle as a standard of light. The researches on this subject, conducted under the direction of the Committee, have shown how untrustworthy the present legal standard of light is, and, notwithstanding the Committee's efforts for obtaining correct concordant results at all the testing-stations under their charge, such testings must remain unreliable until a more exact standard is substituted for the existing one. The Committee, therefore, are glad to receive your offer to attend, with other representatives of the Company, at one of their meetings, as they trust that some agreement may be arrived at for bringing about an alteration in the standard; and I am to request that you and the other representatives of the Company will be good enough to be present at the meeting of the Committee which will be held at this office, on Tuesday next, the 20th inst., at 2 o'clock p.m.

This (continued Mr. Besley) was, under their own hands, an admission—an unequivocal admission—that the system of testing is untrustworthy. It was a remarkable thing that directly Mr. Grimwood disappeared from this station, and Mr. Wade was appointed, he found the gas all right. Still more marvellous was it that the gas in the month of October passed from the Company's Bromley works every day at above 16-candle power, and on some days at 17 candles, and that the gas was tested on its way to Hornsey Road by the Board's own servants, and upon no occasion was it under 16 candles. Could anything be more conclusive than that Mr. Grimwood, by the manipulation of his candles, or by the employment of the graduated chimney which he had no right to use, or by bad candles, arrived at the result he did? The graduated chimney he was absolutely prohibited from using. The Notification of the Gas Referees clearly showed the kind of chimney that was to be employed, and not a word was said about graduated chimneys. Of course, such a picture as this was of the iniquity of this prosecution spoke for itself.

Mr. BROS: I understand you to say it is something very exceptional that the gas should have been not so good on that particular day as on other days.

Mr. BESLEY said the gas was as good as usual on the day in question. [The learned Counsel then read the most recently issued Notification of the Gas Referees, an extract from which appeared in the JOURNAL last week.] It was the result of this very appeal that the alterations alluded to in this Notification were made; and yet the Metropolitan Board came and asked for a penalty of 40s., and this after the letter which he had read from them. When they found a combination of evidence all pointing to the probability that Mr. Grimwood was in error, that the testing was deficient in accuracy, if his Worship could not go behind the Chief Gas Examiner, he at all events could say that a penny was quite enough for the fine; and this was what he was struggling for here—that they should have some expression of justice in that Court. He then went on to argue that the intention of the Act of Parliament was that the gas should be tested during the whole of the 24 hours, and not merely from 7 to 10 o'clock at night. He intended to prove that there was a refusal of the Chief Gas Examiner to hear evidence of the official testings of the Gas Company, although it was the same gas.

Mr. BROS: I consider myself, as I intimated to you the other day, bound by this—the appeal is really not to me at all, but to the Chief Gas Examiner.

Mr. BESLEY: How are you to judge the amount of the fine if I do not show something as to the care with which the gas is manufactured.

Mr. BROS: Any question of a previous conviction may go against you on the question of character. I accept the fact that the Company send out from their works this large quantity of gas every day, which is checked on delivery by the people on the other side.

Mr. BESLEY: I should readily acquiesce in your ruling as to the proof of the refusal of the Chief Gas Examiner to accept evidence, or as to the probability of the testing being taken inaccurately, as you feel bound by the report of the Chief Gas Examiner; but I do tender evidence to show that the greatest possible care is taken at the place of manufacture,

and that the official testings at Devon's Road on this very day showed that the gas was above 16-candle power.

Mr. *W. B. Wright*, examined by Mr. BESLEY, said he was the Engineer of The Gaslight and Coke Company at their Bromley works. About 10 million cubic feet of gas were manufactured there daily. On Oct. 18 he personally superintended the manufacture of the gas at this station; and the tests averaged 16·4 candles. The gas passed the Devon's Road Testing-Station on its way to the Hornsey Road. At Devon's Road the testing gave a result of 16·9 candles. The difference in the tests at the works and at Devon's Road might have been due to the way in which the photometer was used, or to the standard of light.

Cross-examined: The candle was not always unfavourable to the Company; but, generally speaking, it was. There were six or seven other works besides those he superintended. The holders which were supplied from his works occasionally received gas from others. On Oct. 18 the gas delivered into these holders was all made at Bromley works.

Re-examined: They took the test at the outlet of the works after the gas left the holder. The Beckton works were the only ones that communicated with Bromley. It was not possible for gas having an illuminating value of 16·9 candles at Devon's Road to pass on to Hornsey and give a result of 15·3.

Mr. *W. Sugg*, examined by Mr. BESLEY, said that the whole difficulty in the matter of testing centred round the standard of light. The candles might come out one time at a much greater illuminating power, and consequently they would show the gas to be worse than it really was, while at other times they might come out better. Generally speaking, he thought they were more likely to go against the gas than for it. Another thing that affected the question very materially was that sometimes, where the testing-stations were, the gas might, in passing through the mains, if it did not move sufficiently quickly, deposit some of the lighter hydrocarbons on which its illuminating power depended; so that they would perhaps have gas sent from the works considerably above the illuminating power required—say, 17 candles—and yet at one particular point they might suddenly find that the power dropped ½ candle, or something of that sort, by the presence of some naphthalene, either in the state of crystal or oil, in the mains themselves. Consequently, do what they would, neither the Gas Company nor the Gas Examiner, nor anybody else, could alter the fact. He did not think the gas would increase in illuminating power in travelling. The gas at Hornsey Road might have been correctly measured; but if the candle flickered, or they had the question of the naphtha, it might have affected the test. He ought to have said, with regard to the increase of illuminating power, that there was a possibility of gas increasing in value supposing it were to deposit any of its moisture in passing through the mains. This was a late discovery due to Mr. Methven.

Cross-examined: He did the fitting up at the whole of the testing-places in London; but he had no reason to make complaint of the Gas Examiners or their mode of testing. The fittings at this station were the same as elsewhere, and they were very accurate.

Mr. BROS said he hoped there would soon be a standard on which the authorities and the Gas Companies would agree. This was really not a very serious matter; but he was bound by the result of the appeal, and should fine the Company 20s. and 2s. costs.

Mr. BESLEY said he thought it would be fairer not to ask for a case on this occasion, because if the hearing of any future case should not be complete, it would be time to do it then. Looking at the fact that they had now new rules for the using and changing of the candles, he hoped they would not find out mistakes until some time had elapsed. Therefore he should not ask for a case.

Mr. BROS remarked that he was glad of this; and he hoped the Company would take advantage of their opportunity to send somebody there when the gas was being tested, because it seemed to him, if they could only agree when the gas was being tested, these difficulties would not arise.

Mr. BESLEY: The marvellous thing is that whenever the Company did send someone to witness the testings, they always came out all right.

Mr. ROBERTS: I might suggest that there is another reason for that.

LORD MAYOR'S COURT.—WEDNESDAY, APRIL 3.

(*Before Sir* THOMAS CHAMBERS, Q.C., *Recorder.*)

OLNEY *v.* THE GASLIGHT AND COKE COMPANY.

This was an action brought by John Henry Olney, a builder's labourer, living at Leytonstone, to recover damages for personal injuries sustained in consequence of the alleged negligence of the defendant Company's servants.

Mr. MUIR appeared for the plaintiff; Mr. MORTON for the defendants.

Plaintiff, in his evidence, said that last December he was employed in his capacity of labourer, on certain building works, at the Cock Tavern, a new house in course of erection in Love Lane, E.C. Whilst at work in the wine-vaults, he noticed a smell of gas, and communicated the fact to the foreman of the works, who wrote to the Gas Company about the matter. The following morning, the Company sent some men to examine the pipes; and he, in company with the foreman and the gas inspector, examined the vaults. The inspector assured him there was no cause for alarm, as it was only a slight escape, and that he would send some men to make a further examination. Soon after the inspector's departure, whilst at work in the vault, an explosion occurred, causing him to fall backwards on the ground, and sustain serious burns about the face, arms, and other parts of his body. His arm right down to his finger ends was blistered all over; but his hair was only slightly singed. He was conveyed to the London Hospital, where he was an in-patient for twelve days. When he was discharged, his arm was still in a sling; and he was obliged to keep it so for a week. At the time of the accident, he was earning from 27s. to 30s. per week.

In cross-examination, plaintiff said that when the explosion occurred he had a light in his hand; but he denied that the gas inspector had given him strict instructions not to proceed near the gas-pipe with a light.

Evidence was given as to the injuries plaintiff had received.

Mr. *Russell*, the manager of the building operations at the Cock Tavern at the time of the accident, corroborated plaintiff's statement; and in cross-examination said that he was responsible for the filling in of an excavation which had been made near the gas-pipe. This excavation was not made underneath the pipe, but within about 4 inches above it. It was not true that he had taken away any sand out of it; or that he had filled in the excavation with brick rubbish.

Mr. *Joseph Dunn*, an inspector in the employ of the defendant Company, was then called. He said that when he went to the Cock Tavern to examine the pipes, he distinctly warned the plaintiff not to take a light near the gas-pipe. During the progress of the work, the main had been exposed and undermined, the effect of which was that the main sank, and separated the joints. This was really the cause of the accident.

In cross-examination, he said that he presented the report to his Company of the occurrence; but in that report he said nothing about the cavity underneath the main.

A fitter in the employ of the Company deposed that he distinctly heard the last witness tell the plaintiff not to take a light near the main.

Other witnesses were then called to prove that an excavation had been made by the builders below the main-pipe, and that this was really the cause of the explosion.

Ultimately the jury returned a verdict for the plaintiff; damages £25.

On the application of Mr. Morton, leave to move was given, and a stay of execution granted.

*** Owing to the crowded state of our columns to-day, the extended report of the case of *Ungar v. Sugg and Co.* (see *ante*, p. 627), which is in type, is unavoidably held over till next week.

NORTHERN COAL TRADE.—There was less demand for coal last week, and several important collieries were idle part of the time. Steam coal is steady, and the price may be put as from 9s. 6d. to 10s. per ton. Gas coal continues in request for export; but the local consumption is much less than it was, and there have been idle days at well-known collieries. The price for best gas coals varies from 7s. 6d. to 8s., less discount. It is quite probable that the price may increase in the summer, for there seems very little probability of the miners' sliding scale being renewed without a considerable advance in the rate of wages. Manufacturing coal is steady; and there is a generally good demand for coal. Gas coke is now less abundant, and finds a good market at the increased price.

HORWICH GAS SUPPLY.—The difficulty between the Bolton Corporation and the Horwich Local Board with regard to the extension of the gas-mains to certain parts of Horwich, is assuming an acute phase. At the meeting of the Horwich Local Board last Wednesday, the Solicitor to the Board was authorized to take the requisite steps to compel the Corporation to lay the gas-mains to positions shown on plans presented by the Surveyor. The difficulty arose in consequence of the Gas Committee refusing to extend the mains unless a guarantee was given for a certain consumption. The Board then considered a scheme for establishing gas-works of their own, and even went so far as to view eligible sites; but the project appears to be abandoned.

LAUNCESTON (TASMANIA) GAS COMPANY.—The report of the Directors of this Company for the half year ending Dec. 31, 1888, presented at the general meeting of shareholders, on the 7th of February, stated that the six months had been a period of great anxiety to all Australian Gas Companies, on account of the very serious nature of the strike of the Newcastle coal miners; and it was with satisfaction, therefore, that the Directors reported that they had been able to continue an uninterrupted supply of gas, without raising the price, notwithstanding the greatly increased cost of coal. The proposed reduction to 7s. 1d. per 1000 feet had, however, been delayed until the commencement of next half year. The amount to the credit of the profit and loss account was £3021 18s. 9d., out of which an interim dividend at the rate of 11 per cent. was payable. The coal carbonized during the half year was 1969 tons 12 cwt. of Newcastle, and 175 tons 15 cwt. 3 qrs. of shale; and the quantity of gas manufactured was 22,453,600 cubic feet.

LATROBE (TASMANIA) GAS COMPANY.—The Directors of this Company, in their second annual report, informed the shareholders that since the last general meeting the works have been completed in a satisfactory manner, were opened on the 14th of April, 1888, and have since continued to work satisfactorily. On that date the number of consumers who had the gas laid on was 34. Since then the number has increased to 79; while the fittings have been laid into several houses, which no doubt will soon be burning gas. The works have lately been inspected by Mr. T. S. Cleminshaw, Engineer of the Company, and found by him in a very satisfactory working condition. To this gentleman the Directors express their indebtedness for having given a lecture on the manufacture and consumption of gas, which had the effect of showing to many the value of gas as a means of cooking, &c.; and the result has been that cooking-stoves are in greater use. The Directors recommended that a dividend for the half year ending Dec. 31, 1888, at the rate of 6 per cent. be declared on the paid-up capital; after the payment of which there would be a balance of £40 to the credit of profit and loss.

THE PUBLIC LIGHTING OF GLOUCESTER.—At the meeting of the Gloucester Town Council last Wednesday, it was stated that the Committee appointed by the Council had had an interview with the Directors of the Gloucester Gas Company, and had submitted a memorandum of their views on the two main questions at issue—viz., as to the excessive consumption of gas by metered lamps, and as to the illuminating power of the gas—and that they felt bound to press for some such arrangement as this, to apply from July 1 last: That every lamp consuming more than 4·25 cubic feet of gas per hour be excluded when calculating the average consumption of the metered lamps until its consumption is reduced to or below 4·10 cubic feet per hour; and that every metered lamp continuing to consume more than 4·10 cubic feet of gas per hour for a longer period than one calendar month, be also excluded until its consumption is reduced to or within such limit. The illuminating power of gas has not been satisfactory for some time past. Having regard to the fact that the London burner is now more generally used than the Birmingham burner, the Committee think the former ought to be adopted; and they recommend this course, if the Company will agree to supply gas equal to 16-candle power when tested by the London burner. The Committee further reported that the above and other questions were fully discussed; and the Directors promised that they should receive careful consideration. The report was adopted.

OPENING OF A WORKMEN'S HALL AT MESSRS. J. MILNE AND SON'S WORKS, EDINBURGH.—A spacious hall has recently been erected adjoining the Milton House Works of Messrs. James Milne and Son, Engineers and Brassfounders, Abbeyhill, Edinburgh. It is capable of accommodating upwards of 500, and is provided with several side rooms. For public purposes, the hall is placed under the charge of the tenant who leases the refreshment-room which communicates with the hall. This room is to be open from half-past five in the morning, for the sale of tea, coffee, &c., throughout the day. Last Friday evening the hall was formally opened by a social meeting, given by the firm to their *employés* and friends, who completely filled the place. Mr. James Milne, the senior partner occupied the chair, and said the firm had arranged to allow the workers the use of the hall free during meal times, and on such other occasions as might be required, for the purpose of political, social, or educational meetings. He hoped it would afford facilities for improvement and recreation, such as could be better enjoyed in a hall of this kind, than elsewhere, and that every advantage would be taken of the opportunities thus afforded to all connected with the works. Mr. Macfie, a member of the firm, announced that in the event of a suggestion which had been made by Mr. Milne, as to the formation of a drawing class for the apprentices, being adopted, one of the works managers had offered to conduct such a class. A varied programme of vocal and instrumental music, interspersed with readings, was then gone through, and heartily enjoyed by the audience.

Miscellaneous News.

COMMERCIAL GAS COMPANY.

The Ordinary General Meeting of this Company was held last Friday at the Cannon Street Hotel—Mr. T. Wrake Ratcliff in the chair.

The Secretary (Mr. H. D. Ellis) having read the notice calling the meeting,

The Chairman said: Before proceeding with the ordinary business, will you permit me for a moment to refer to the loss we have sustained by the death of our esteemed and valued Chairman, Mr. Richard Bradshaw. We little imagined when we met last October that we should lose him so soon, though his health had been to some extent impaired; and when we announced at the time the death of Mr. Griffith Thomas, our Deputy-Chairman for so many years, we little thought that we should lose him, and so be deprived of his services. I need hardly say how much we regret the loss of such a valuable Director. He always worked harmoniously with his colleagues. He had a considerable stake in the undertaking; and he represented others who were largely interested. He was fully conversant with the affairs of the Company; and took a lively interest in its prosperity. His counsel was at all times valuable; and he acted with great judgment. I can assure you that we miss him very much. You will all remember the happy way in which he presided over our half-yearly meetings; and the Directors and myself think it would not be right, and that you would not approve of this meeting being closed without an opportunity being afforded to the shareholders for passing a resolution paying a tribute of respect to his memory. I will, therefore, propose the following motion:—"That the proprietors of the Commercial Gas Company, this day assembled, desire to express their sense of the loss which the Company have sustained by the death of Richard Bradshaw, Esq., who was nearly 25 years a Director, and for more than 13 years the Chairman of the Company; their gratitude for his constant exertions to promote the Company's welfare; and their high appreciation of the ability, courtesy, and impartiality with which he presided as Chairman at their general meetings. They also desire to offer to his widow and family the expression of their deep sympathy." I think that this resolution embraces all that I need say. Perhaps some gentleman on the other side of the table will second it, as it is a shareholders' motion; the Directors having already passed a resolution in somewhat similar terms.

Mr. Coleman, in seconding the motion, said that he could bear testimony to everything that had been said by the Chairman.

The Chairman then put the motion, and declared it carried; adding that he would take care that the resolution was conveyed to Mr. Bradshaw's family.

The Secretary then read the minutes of the last meeting; and the report of the Directors, and the statement of accounts—which were given in the Journal last week, p. 628—were taken as read.

The Chairman: I have now to move—"That the report and accounts be received and adopted and entered on the minutes." This is what we may almost call our Jubilee year, because in 1839 this Company was started. I have to congratulate the proprietors upon the very satisfactory accounts we have to lay before you to-day. The revenue account shows a net profit for the half year of £57,034; making, with £1219 received for interest, £58,254. This, added to the amount brought forward from previous half years, makes £108,020. Deducting therefrom £2727 15s. 4d. for interest on debenture stock, there remains standing to the credit of the net revenue account a balance of £105,292, of which, having regard to the sliding scale and the price of gas charged during the half year, £44,800 is available for dividend. I will, as we always or generally do, refer to what has taken place in the past half year and in the corresponding half of the previous year. The sale of gas for the half year under discussion produced £119,438; and in the corresponding period of 1887, £112,802; and the meter and stove rental for the past six months amounted to £2730, against £2633. We next come to the residual products. The coke brought us £25,241, against £20,296; breeze, £420, against £385; tar £6422, against £4860; ammoniacal liquor and sulphate, £9731, against £9395. The miscellaneous receipts are very much the same. On the other side of the accounts, in the manufacturing department, the coal cost £59,470, against £56,737 in the corresponding period of 1887; the salaries of engineers, superintendents, and other officers at the works, came to £1951, against £1960; carbonizing wages were £14,007, against £13,150; purification, £3046, against £2970; and the repairs and maintenance cost £8893 in the past six months, against £10,107. The manufacture of gas, therefore, cost us £87,369, as compared with £84,924. This is an increase; but we have had a large increase in the make of gas. As to the distribution of gas, salaries and wages of officers (including rental clerks) came to £2246, against £2150. Repairs, maintenance, and renewals amounted to £2232, against £2166; and the repairs and renewals of meters and stoves were about the same for both periods. In the item of public lamps, there is little difference—£2080, against £2125. Rent, rates, and taxes came to £4997, against £4805. Under the heading of management, the Directors' and the Auditors' allowance is the same; the salaries of the Secretary, Accountant, and clerks were the same; collectors' salary and commission amounted to £1538, against £1489; stationery and printing stands at £381, against £481; and general charges, £446, against £405. The total amount, under the heading of management, is thus £4729, against £4731. Bad debts were £851, against £801. That is an item we cannot get rid of. There are always a certain number of people who run away, and we cannot recover all that is owing to us; but we do everything we can. Every precaution is taken, and every exertion is used to prevent loss on this account. But it is the same with us as with other gas companies; and I suppose the remark applies in all the commercial world. The law and parliamentary charges were £162, against £70; superannuations, £907, against £952; and official officers, £82, against £127. The balance carried to profit and loss is £57,034, against £46,233. I will now give you a little summary of what I have said. The chief feature of importance is the increase in the half-year's gas-rental of £6636. That is due to a larger sale of gas by almost 57 million cubic feet, or nearly 6¼ per cent. This, I think, you will consider very satisfactory. There is an increase in the returns from residuals of £6880, which arises largely from the improved selling price of coke and tar. Including the increase from other sources, the total increase in the receipts is £13,626. We now come to the other side—the expenditure. The increased revenue I have mentioned has been obtained for a total increase in the expenditure of only £2825, of which the extra coal which was necessary to meet the increased sale came to £2733; leaving only £92 as the aggregate increase of expenditure in all the other items. There has been a saving in wages of £857; an increase in purification charges of £76; and an increase in wear and tear in the manufacturing department of £1214. But the whole of the remaining items show very little difference; the net difference in the whole, excepting the item of coal, being, as I have said, only £92. The profit is, therefore, £10,801 in excess of that for the corresponding period of the preceding year. The coals have cost 11s. 11½d. per ton, which is nearly 2d. per ton cheaper than last year. The leakage was 5·89 per cent., or nearly ½ per cent. lower than in the corresponding period. The capital account has been added to by £1006 spent on stations, £315 for new mains and services, and £1131 for new stoves and meters. The extensions of works charged to capital have not been of importance. There were in all 2717 yards of mains replaced by larger ones or extended. There were 291 additional services put on (representing so much more new business); there were 239 extra new meters placed in the district; and there was an increase of 196 stoves. The total number of gas-stoves out on hire now is 2174. The Directors state in the report that they have resolved to reduce the price of gas from 2s. 6d. to 2s. 4d. per 1000 cubic feet. We think that trade is reviving; that things are getting better; and that we shall not make a loss by this reduction of price; but that we shall recoup ourselves by the increased consumption we shall have—at least, we hope so. I ought also to mention another matter, though it is referred to in the report—the appointment of new Directors. In the place of Mr. Thomas, Mr. W. Graham Bradshaw, the son of our late Chairman, who represents a large interest in the Company, has been appointed; and Mr. Thomas Bevan has been elected in the place of Mr. Richard Bradshaw. Mr. Bevan was Sheriff for the County of Middlesex; he is a Magistrate in the County of Kent, and I believe of Middlesex. He is resident at Stone Park, Greenhithe; and he is very well known. He is a large shareholder—almost the largest shareholder we have; and that is another important point. There are two retiring Directors. One of the Auditors also retires; and there is a vacancy in the auditorship, caused by the death of Mr. Blackman. The meeting will therefore have to elect another Auditor; and they will also have to deal with a proposal for increasing the remuneration of the Secretary. I now propose the adoption of the report and accounts.

The Deputy-Chairman (Mr. J. B. Gill) seconded the motion.

Mr. George Livesey: I have much pleasure in congratulating you, Sir, on the very satisfactory statement of accounts presented to us, which does equal credit to the Directors, Engineer, and Managers. I have only risen to ask one question, because comment is really superfluous on such a satisfactory statement as that which you have laid before us. I see in the capital account you say, "less premium on debenture stock issued, £2155 0s. 10d.," which is deducted from your capital account; thereby writing off capital. On referring to back reports, I find that, in 1885, you wrote off £3458 12s. received as premium on debenture stock, and £491 12s. 9d. profit on some 2½ per cent. stock sold. It is very satisfactory, no doubt, to reduce capital; but this is not the usual way in which premiums are dealt with. I understand that in your case they are voluntary premiums. You were not bound to sell debenture stock by auction or tender. Therefore you have done a voluntary act, and have thus placed in your hands a certain amount of capital on which you pay no interest; but I think it is advisable that this should be permanently shown as a matter to your credit. If it were stated on the other side of the account as "capital received—premium on debenture stock," you would have something like £6000 odd shown in the account. That would be permanently in evidence that you are doing the best you can for the public in raising capital at the lowest possible rate; whereas, putting it as you now do, it is written off and done with. I put this forward as a suggestion, because in other companies where a premium is received, it is credited on the other side as capital received and spent.

The Chairman: In answer to Mr. Livesey, I may say that this is the way it has always been done. You know—and Mr. Livesey knows—that the accounts are passed by the Official Auditor.

Mr. Livesey: He passes the other accounts in the other way.

The Chairman: There are auction clauses in those cases; and we have no auction clauses.

Mr. Livesey: I know you have not.

The Chairman: Well, we will consider it.

The motion was then carried unanimously.

The Chairman moved the following resolution:—"That, pursuant to the recommendation of the Board of Directors, a dividend be declared for the half year ended the 31st of December, 1888, after the several rates of £13 15s. per cent. per annum upon the old stock, and of £10 15s. per cent. per annum upon the new stock, in both cases less income-tax, and that warrants for the same be forwarded to the proprietors."

The Deputy-Chairman seconded the resolution, and it was carried unanimously.

Sir R. Rawlinson congratulated the Directors on the reduction they had made in the price of the gas. There was no escaping, he said, from the fact that electricity was establishing itself. Referring to the inquiry now proceeding before the Board of Trade, he urged the Directors to devote all their energies to making the best possible gas and selling it at the lowest possible price; at the same time maintaining the works in the highest state of efficiency, and exercising continual supervision. One-half of the complaints that were urged against gas arose from defects in services and in the burners. He believed it was possible that wealthy men might in time choose the electric light in preference to gas; but he was absolutely satisfied that there was no chance of the electric light ever coming into competition with gas for street lighting, for general purposes of illumination, or for the domestic purposes of heating and cooking. From information conveyed to him, he knew that the best and most successful cases of electric lighting for domestic purposes cost at least double, and in most cases threefold, the expenditure for the gas. As to some of the points urged in favour of the electric light, it had come to his knowledge that the ceilings of rooms were just as much dirtied by the electric light as they were by gas. He was a lover of the fine arts. He had thought of putting the electric light in his house for the sake of his pictures; but he came to reflect that if he chose to light his rooms with gas, and have good ventilation, he would not find his pictures suffer. They were told that the electric light had the quality of sunlight. He supposed it had. He, however, carefully shaded his pictures from the slightest gleam of sunshine; and it had struck him that if he adopted the electric light, his pictures might sustain a great deal more harm from it than they would from gas under any conditions. Gas companies must not despair in the slightest degree; but they must all be on their mettle. Gas proprietors, too, must not fret and part with their stock, because of the fuss that had been caused by electric lighting. He hoped that Mr. Livesey would say a few words on the subject.

A Shareholder asked whether they could use the apparatus on their works in connection with water gas.

The Chairman: I am sure that the Directors agree with what Sir Robert Rawlinson has said. We are quite alive to the fact that to compete with electricity—presuming it is going to be what some people say—we must make gas as cheap as we can, and so keep the electric light out of the field; but perhaps our Engineer may be able to say a word on the subject afterwards.

Mr. Harston stated that, in conversation a few days ago with the manager of one of the largest insurance companies, he was told that several proposals for insurance had been received from manufacturers where water gas was supplied, and that such proposals were refused on account of the great risk from fire that followed the use of water gas.

Mr. Livesey: It has been my policy ever since the electric light scare

ten years ago never to allude to electricity. Our business is with gas; and if we do the best we can with gas, I have no fear whatever of such an opponent. I think the statement made by Sir Robert Rawlinson is so clear, and so conclusive, that nothing I or any one else could say would add to it or improve it in any way; but I do feel that a gas company's duty is to serve their consumers as well as they can, and at the lowest possible price, and with gas of good uniform quality; and they should do all they can to remove obstacles and restrictions to the use of gas. In days gone by, there used to be a system of deposits, in order to avoid bad debts. That system has been worked too much in times past. I think gas companies are quite aware of the fact; and they are not exacting such deposits now where they can be avoided. The deposits are necessary sometimes; but they should be avoided wherever they can be. The abolition of all deposits where possible, the giving facilities for services without cost to the consumers, and helping them in the way of fittings—that is what we should do. I think the time is coming when gas companies should supply fittings. I mentioned at the recent meeting of the Chartered Company that we can learn something from very small companies; and that the Secretary of the Sheppy Gas Company, Mr. A. W. Marks, had written to the JOURNAL OF GAS LIGHTING* a letter stating his experience and the success of letting fittings on hire to the working classes, and how he had then adopted the hire-purchase system, and found most successful. I think with all these points before us, there is no fear as to our holding our own against all competitors. As to water gas, I never saw a more clap-trap advertisement than that of the five columns which appeared in *The Times*; and next day there were applications for £300,000 to be subscribed towards this Syndicate, of which £200,000 was to go to certain people who had patents. Water gas is an old thing. My first experience in gas was superintending a water-gas experiment in 1851. There are many systems in America, where water gas is produced, sometimes I believe (but Mr. Jones will know this more than I) in connection with gas companies. It is, however, non-luminous gas; and it can only be made luminous in two ways—one, by enriching it with oil or petroleum, as is done in America, and the other way as is proposed in this new system, by putting in a piece of platinum or magnesia to render it incandescent. If, however, there is anything in water gas, gas companies can make it, mix it with their own, and supply it. There is no possibility of a water gas company starting in London or anywhere where coal gas is supplied. If there is anything in it, we can adopt it. It is not only non-luminous, but without smell; and it is highly poisonous.

A SHAREHOLDER: Can it be produced at 4d. per 1000 cubic feet?

Mr. LIVESEY: That is all nonsense.

The CHAIRMAN: I would say, as regards deposits, that the Board of the Commercial Gas Company are quite alive to that point.

Mr. LIVESEY: I am sure of that.

The CHAIRMAN: And as to fittings, we are adopting the very system that Mr. Livesey refers to.

The resolution was carried unanimously.

The DEPUTY-CHAIRMAN then proposed, and Mr. H. L. HAMMACK, J.P., seconded, a resolution for the re-election of the retiring Directors (Messrs. Ratcliff and Fairclough); both gentlemen recognizing the loss which the Company have sustained by the death of Mr. Richard Bradshaw but maintaining that, with Mr. Ratcliff as the successor of the deceased gentleman, the Company would not suffer.

The resolution was agreed to.

The Chairman briefly returned thanks on the part of himself and Mr. Fairclough for their re-election.

The retiring Auditor (Mr. G. Ilsley) was next re-elected.

On the motion of the CHAIRMAN, seconded by the DEPUTY-CHAIRMAN, a resolution was next passed increasing the remuneration of the Secretary by £100 a year.

The SECRETARY, in returning thanks, assured the proprietors that it had been a very great satisfaction to him to watch the progress of the Company throughout the past year, and to see it attaining step by step to the degree of prosperity to which the Chairman had so happily alluded; and when they bade him share with them in that prosperity, as they had just done, he need not tell them that his satisfaction became much enhanced.

Mr. LIVESEY next proposed the election of Mr. A. G. Hounsham as an Auditor to fill the vacancy caused by the death of Mr. C. T. Blackman. In Mr. Hounsham, he felt sure the Company would have an honest and most capable man, who would efficiently discharge his duties.

Sir R. RAWLINSON seconded the motion, observing that Mr. Hounsham had served under him when he was a Director of the London Company.

The motion was carried unanimously.

Mr. HOUNSHAM, in returning thanks, said he would devote his best abilities to the faithful discharge of the duties of the office.

Mr. LIVESEY then proposed a vote of thanks to the Chairman and Directors; observing that the Board had their hearts in their work, and that they could be thoroughly trusted to do the best they could both for the shareholders and the consumers.

Mr. CECIL seconded the motion, which was carried unanimously.

The CHAIRMAN returned thanks on behalf of his colleagues and himself; and subsequently proposed a vote of thanks to the Engineer, the Secretary, and the officers of the Company, to whom, he observed, was due a great deal of the prosperity of the undertaking. Mr. Jones, he added, was always very indefatigable in his general management, and the result which he produced was always good.

The DEPUTY-CHAIRMAN seconded the motion, which was carried unanimously.

The ENGINEER (Mr. H. E. Jones, M. Inst. C.E.): In thanking you for this proof of your goodwill, I should like to say that it comes upon me not unmixed with some little sense of melancholy; for a similar vote was passed in this room for a considerable number of years at the instance of the late Chairman, whose death is not only a great loss to your administration, but a severe personal loss to myself. It was—I should like to be allowed to say, though I detain you—a great pleasure to have to be associated with him. It was almost an education. He combined a very powerful grasp of mind with a high tone of commercial spirit; and, in addition, had such gracious, gentle, conciliatory personal qualities as were exceedingly pleasant to all who were connected with him, especially in a subordinate position, as I was. There is, however, some consolation for us all in the fact that we have a Chairman to-day who thoroughly understands our circumstances, who has for a long time been connected with us, and who takes the greatest possible pains to do justice to his position, as you will have very well realized to-day. There have been one or two matters spoken of which I might perhaps be pardoned if I replied to. Sir Robert Rawlinson almost pointed to me as well as to my esteemed friend Mr. Livesey in connection with the question of electricity. He really sounded a true note on this, which is the only standpoint in which I regard the electric light with any kind of weight at all. It has attracted, by a scientific will-o'-the-wisp, a large amount of capital, which does not seem to look for the natural return which capital generally does look for in the shape of good solid interest derived from the profit of carrying on business. I have been acquainted with towns where the electric light has been in use for some little time past. In those cases they do not earn a shilling of profit; but they are kept alive by the people who are found capable—I might say, incapable—of leaving their capital in such an investment, and subscribing further money without the least security that they are going to get any return on it. It is quite true that electric lighting has reached a certain position of—I will not call it certainty; but it is less uncertain than it used to be. It has, however, no more to do in the great field of domestic and street lighting than champagne has to do with the ordinary fare of the population at large. It is quite true that you will always find extravagant people who will drink champagne! but beer is the thing that goes with the multitude, always excepting Mr. Livesey, who drinks water. (Laughter.) But I should be quite contented to hold the brewery as against the gentleman who has the champagne. We might both earn a living; but I believe that mine would be the better. As to water gas, I threw out a hint at our last meeting that I had seen something in America that would not make my visit there altogether unprofitable to you. I saw this water gas being used in America in conjunction with a very cheap supply of petroleum oil, which we have not got here yet, whatever we may be threatened with from Russia and all parts of the world. But there, where you get this oil for 2d. a gallon, water gas is produced cheaply, in large volume, and very rapidly? As, however, you see in the prospectus of this new Company, the use of gas coke is required; for the ordinary bituminous coal is not fit to produce it. You must have anthracite coal, or steam coal (which is very expensive), or coke. There is a facility in connection with the use of the surplus coke of gas companies and the use of petroleum oil when it gets below 3d. per gallon (which is the price it is sold for in America) for making gas that can be used to enrich the common coal gas, which takes the place of cannel gas. This gas which was produced in America—by a different system from that of Mr. Samson Fox—would be a very useful adjunct to gas-works whenever the oil came down in price as I have said. As, however, Mr. Livesey has said, no one can come into the field, but the gas companies themselves. I saw in these water-gas works, the whole of the machinery of our gas-works, excepting that the retort was different It is obvious, then, that you have, to begin with, against any one coming into the field, the meters in the houses, the service-pipes, the mains, the gasholders, the washers, the scrubbers, the purifiers—the whole of the plant except the retorts; and as your retorts wear out every three years, the ordinary reparation would enable you to replace any such retort with the new arrangement. There is not, however, the least chance of the process which I saw in America coming into use until oil is very much cheaper. When this happens, you will see that this oil would give you a good sheet-anchor as against a possible "ring" in the coal market—a very useful alternative. This Company—I have been struck more than once by this in connection with our accounts—uses a considerable proportion of cannel coal in order to make the gas supplied of a better quality. I am very proud—and I think my pride will be shared in by all who are here—to know that the circumstances of your Company enable you to make rich gas, and that the poorest part of London is supplied with a liberal and good-quality gas.

The SECRETARY having also acknowledged the compliment, the proceedings terminated.

* See *ante*, p. 203.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Half-Yearly General Meeting of this Company was held on Saturday, the 30th ult.—Mr. E. FOTTRELL, J.P., in the chair.

The SECRETARY and MANAGER (Mr. W. F. Cotton) having read the notice convening the meeting, the report of the Directors for the half year ending Dec. 31, 1888 (an abstract of which was given in the JOURNAL last week), was taken as read.

The CHAIRMAN, in moving the adoption of the report, said he deemed it to be eminently satisfactory, because, notwithstanding the reduction the Company had made in the price of gas, they were enabled to pay the same dividend as before. Contrary to the usual custom, a lowering of the price of gas had not been followed by increased consumption; therefore they were at a loss of more than £4000 in the amount received for gas. On the other hand, they had had a very fair increase in residual products; and this had helped to maintain the dividend. But this was not the most satisfactory point to which he wished to draw attention. In a gas company the great art of maintaining dividends was to sell as much gas as was made. There was no company in the United Kingdom who did that. But the next best thing was to do as near this as possible; and he had great pleasure in stating that the quantity of gas unaccounted for by the Company last year had been brought down to 8·44 per cent. He challenged any company in the United Kingdom to show a better result than this, taking into consideration the area over which they had to supply, in proportion to the small quantity of gas they sold as compared with other companies. He could hardly promise a further reduction in price; but their officers would use every endeavour to minimize it still further. As regarded the items in the accounts, the price of coal was about the same; but, owing to the remarkable state of trade in regard to freights—a number of vessels coming in together—they were put to an additional expense of storeage and hauling, which was added to the first cost of coal, and it kept the price of coal a little higher than he would wish. The reserve fund was full; and they had their investments very well placed. They were worth about £3000 more than the figure at which they stood in their books. Without making any promise for the future, he felt sure that for some time to come the Board would have great pleasure in offering their shareholders the same dividend that they now recommended.

Mr. DRUMMOND seconded the motion.

Professor HULL, Director of the Geological Survey, said he had noticed with regret from time to time expressions in the public press reflecting rather adversely upon the Company, on account, first, of the alleged high cost of the gas supplied to consumers; and, secondly, of a deficiency of light. With the assistance of Mr. Cotton, he had been enabled to obtain the prices charged for gas in the principal seaport towns in Ireland. At the head of the list stood Belfast, which had exceptional means of supplying cheap gas, owing to the enormous quantity consumed in the mills, and the low price at which the money could be borrowed by the Corporation, who owned the gas-works, as compared with a private company. Belfast supplied gas at 2s. 9d. per 1000 cubic feet; Derry, at 3s. 10d.; Limerick, at 4s. 9d.; Cork, at 3s. 9d.; and Waterford, at 4s. 3d. Dublin supplied gas at 3s. 4d., with a reduction to large consumers; therefore they had no reason to be ashamed of the position they held. He thought the particulars as to the reduction in the price of gas in Dublin would be interesting. He found that in 1860 the price was 5s.; in 1886, it was 4s. 6d.; in 1870, still 4s. 6d.; in 1875, it was raised to 5s. 4d.; in 1880, it stood at 2s. 9d.; and now it was 3s. 4d. And this reduction on the part of the Con pany had been voluntary, and not the result of pressure. Then, with regard to the deficiency in lighting power, he had taken the opportunity of going

over the Company's works; and he had noticed with very great interest and satisfaction their vast size, and the admirable appliances by which the gas was obtained at the lowest possible cost. He went into the testing-room, and satisfied himself that the gas was up to the standard of 16 candles. As the charges of the Corporation had been pretty clearly met by the action of the Board, he should not further deal with them. Perhaps he might be allowed to refer to another matter—the proposal by the Corporation to, as he might say, resolve itself into an Electric Lighting Company, Unlimited. Of course, the funds at the disposal of the Corporation for such a purpose came from the ratepayers and other sources belonging to the city. But before the Corporation or any other body made the proposed experiment, he thought it might be just as well to remind them of the fate of the only Electric Lighting Company that was ever started in Dublin. He could speak feelingly, because he was an unfortunate shareholder himself. The City of Dublin Electric Lighting Company, which was started about 1861, expended first on the Brush concession £1000 in cash, besides £9000 in fully paid-up shares; in plant and machinery, £11,463; in preliminary and other expenses, £4000—making in all £16,463. This was cash actually expended by the shareholders of the Company. The concern was started, and the machinery set going; and after about 14 months of experience, the sad results were somewhat as follows:—From the rental of the electric light there was a profit of £1532; but the expenses were £2549—leaving a loss of £1017. When this result had been arrived at, the Company had used their full working power—had obtained the full result from their machinery—and the question arose were they to go on erecting new machinery and lamps with the possible hope of ultimately making a profit. After considerable discussion, it was decided not to lose more money. There they were with this large plant on their hands; but fortunately the Gas Company came forward, and bought the machinery for £3000—less than one-fifth of what it cost. The Corporation might dance if they liked; but the ratepayers would have to "pay the piper."

The Chairman said there was no man in Dublin who possessed greater practical knowledge or higher scientific attainments than Professor Hull; and therefore he was sure the shareholders had all listened with great pleasure to the account he had given of the late Electric Lighting Company.

The motion was carried.

The Chairman next moved that a dividend at the rate of 10½ per cent. per annum be declared on the old shares, and of 7½ per cent. per annum on the new shares.

Mr. C. Lawler seconded the motion, which was agreed to.

The retiring Directors and Auditor having been re-elected,

A vote of thanks was passed to the Chairman and Directors, for their able management of the Company's affairs.

The Chairman returned thanks, and said he should be devoid of common good nature were he to attribute either to himself or to the Board the good accounts they had at that meeting. He must pass the vote on, and give it to the Secretary and the officers.

Mr. H. J. Gill moved a vote of thanks to the Secretary and officers, for the very able and efficient manner in which they had discharged their duties.

The motion having been carried by acclamation,

Mr. Cotton in acknowledging the vote, said the advantage of the reduction in the leakage had really been to the consumers; for the shareholders were only receiving ½ per cent. dividend more than they had when the unaccounted-for gas was from 18 to 20 per cent. The reduction in the leakage had enabled them to reduce the price of gas, and not increase their dividend. He hoped that before long they would bring their unaccounted-for gas as low as 5 per cent.

The proceedings then closed.

SHEFFIELD UNITED GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Tuesday—Sir F. T. Mappin, Bart., M.P., in the chair.

The report and accounts for the six months ending Dec. 31, 1888, of which an abstract appeared in the Journal for the 19th ult. (p. 537), having been taken as read,

The Chairman, in moving the adoption of the report, said the balance-sheet twelve months ago was not at all satisfactory to the Directors, seeing that it left the Company with less profit than they had anticipated, as although they were able to pay the full dividend, the amount they carried to the reserve fund was comparatively small. He was glad to say that for the corresponding half year, which expired in December last, they had a much more satisfactory account to render; for, after paying the 10 per cent. dividend, which amounted to £32,443 1s. 6d., they were able to add to the reserve fund £9245 18s. 11d., besides carrying the interest on the reserve fund—amounting to £1232 15s. 1d.—direct to that account. This showed that for the half year, besides paying the full 10 per cent. dividend, they had carried to the reserve fund £10,478 9s., which, he thought, would be regarded as a very satisfactory state of things. The reserve fund would now be at its maximum; and there was a balance amounting to £54 14s. 3d. to be brought forward to the present half-year's accounts. There had been no special increase in the working expenses of the Company during the past six months, but, on the contrary, some decrease. An important feature of the last half-year's operations was that they had sold £7749 worth more gas than during any previous six months. From this it appeared to him that the Company was in as substantial and as satisfactory a condition as the shareholders could well expect or desire. They had also sold residuals amounting to £2417 more than they did in the corresponding half year. The large increase in the consumption of gas compelled the Directors to look out for additional storeage room, and to prepare themselves fully for whatever demands might be made upon the Company. During the half year the increase in the consumption of gas was 73,974,000 cubic feet, or 9·89 per cent. The Directors, under the circumstances, intended applying for a Provisional Order for the erection of a large holder capable of containing 3 million cubic feet of gas. The matter was one which would not permit of delay. The successful result of the last half-year's working had led the Directors, and the nominee Directors as well, to consider the question of further reducing the price of gas. They had every desire to do this; and they would make a reduction when they felt they could do so without a probability of having to increase it again at some future time. But for the fact that the Company would shortly have to incur considerable expenditure out of revenue, the Directors might probably at that meeting have announced when the reduction would take place. Seeing that they would have to spend some £10,000 or £12,000 during the next six or twelve months, and as there were indications that the cost of the manufacture of gas would not be decreased, they considered it wise to defer for the present intimating when the reduction would come into force. But he could assure them that the delay would not be very long. Since the Company last met, the Directors had lost an esteemed colleague whom they and the shareholders alike respected—Alderman Hobson. As his successor they had elected Mr. R. A. Hadfield. At the meeting of the Company six months ago, it was decided that the shareholders should subscribe to the cost of a portrait of their esteemed Law Clerk (Mr. W. Wake), and that it should be placed in the Board-room. Since then the Directors had considered that it would be a greater compliment to Mrs. Wake and to the members of Mr. Wake's family, if the portrait were presented to them, and the Directors would be glad to have authority to do this.

Mr. H. Hutchinson seconded the motion.

Mr. J. Wilson said he imagined the application for a Provisional Order was only for power to erect a new holder and not to buy land, as the Company were already in possession of land.

The Chairman, in reply, said that under their existing Act the Company had power to buy land, but not to store gas upon it. They had land, and part of a gasholder already constructed; but it would cost so much money to bring it into use that the Directors considered it would be cheaper and more satisfactory to put a large holder where they contemplated. The reason they had to apply for a Provisional Order was that a few people in the neighbourhood objected to gas being stored there.

The motion was then put and carried unanimously.

On the motion of the Chairman, seconded by Mr. J. W. Harrison, a dividend of 5 per cent. was declared on the "A," "B," and "C" stocks, 6s. per share on the "E" shares, and at the rate of 10 per cent. per annum on the "D" shares (24s. per share paid up on the 6th of last November).

It was then agreed that the portrait of Mr. Wake be presented to Mrs. Wake and family, instead of being placed in the Board-room as originally contemplated.

A vote of thanks was accorded to Sir F. Mappin for presiding, and the meeting terminated.

PARTICK, HILLHEAD, AND MARYHILL GAS COMPANY.

Proposed Issue of Debenture Stock.

The Directors of the Partick, Hillhead, and Maryhill Gas Company, looking to the future of the important concern under their guidance, are proposing to take a forward movement of very considerable consequence. They have summoned an extraordinary general meeting of the shareholders of the Company, to be held in Glasgow on Thursday of the present week, to take into consideration, and, if so resolved, to pass a special resolution giving the Directors authority to issue debenture stock or annuities to the extent of £80,000 (being the present borrowing powers conferred upon them by the Company). It is proposed to do so at a rate of interest not exceeding 4 per cent. per annum in perpetuity, and to issue the said stock or annuities from time to time, on such terms and to such persons as they may think fit. The special resolution, if passed, is to be added to the Articles of Association. It contains several important provisions, one of which is that the sums raised by the issue of the said debenture stock or annuities shall, so far as required for the purpose, be applied to paying off existing terminal debentures of the Company, and so far as not required for the general purposes of the Company. Another is that the holders of the proposed debenture stock or annuities shall not, as such, be members of the Company, or have any right to attend or vote at meetings thereof. The fourth and last one is that the amount of the debenture stock or annuities may, from time to time, be increased to an extent not exceeding £20,000, by an ordinary resolution of the shareholders passed at any general meeting of the Company.

In a special circular which they have issued with the notice convening the extraordinary general meeting, the Directors have explained that, by resolutions passed at various dates, the Company have authorized the borrowing of sums on debentures, amounting in all to £80,000. These borrowing powers, they go on to say, are at present exercised to the extent of about £50,000—a sum which is represented by terminable debentures. Falling due, as they do from time to time, these debentures have in the past been a source of anxiety to the Directors and of risk to the concern; and the Directors consider it would be to the Company's advantage to have the debenture debt converted into a 4 per cent. debenture stock, to be issued from time to time as the debentures fall due, and that, in the event of any further capital expenditure being required, it should be provided for also by the issue of such debenture stock instead of terminable annuities. The Directors further state in their circular that in the event of the Company passing the special resolution which is to be submitted at the general meeting, they have received an undertaking from responsible parties to take up from time to time, as required, the whole debenture stock issued at par.

As regards the additional capital expenditure probably required to be provided for, the Directors state that during the present year the sum of about £4000 will fall to be charged to capital, being the estimated cost of the additional gasholder referred to in the last annual report, and of other additions and extensions, and that the very rapidly increasing sale of gas will demand further extensions during the next few years. They estimate that the consumption of gas this year will be from 8 to 10 per cent. over that of last year, and that there is every prospect of a continuance of this rate of increase. The arrangement now proposed will guarantee that the necessary capital will be forthcoming for all extensions that are likely to be required for many years.

The Price of Gas at Dudley.—A deputation of the Dudley Town Council recently waited on the Gas Company in reference to the price charged for gas in the borough, with the result that the Directors have promised to reduce the price 3d. per 1000 cubic feet from June 30. The deputation sought a reduction of 6d. The price to small consumers after June will be 3s. per 1000 feet.

Rotherham Corporation Gas Supply.—The question of the appointment of a Sub-Committee to consider what extensions and alterations are requisite at the gas-works to ensure efficiency and economy in working was again brought forward at the meeting of the Rotherham Town Council last Wednesday. Alderman Gummer urged that something must be done to the works; for it was impossible for them to go on as at present. Mr. Walker expressed a hope that any recommendations the proposed Sub-Committee might make would be carried out, and that they would not be treated in the way that recommendations of Committees on the same subject had hitherto been dealt with. They specially needed more purifying power. It was entirely the fault of the Committee, and not of the Manager, that the gas was not properly purified, because the Committee had not carried out the recommendations of the Manager. Mr. Jenkins remarked that the plant had remained in its present condition for many years past, although there had been a growing damand for gas. They had not been able to supply the gas required, nor to make the amount of profit they could have done. He also alluded to the insufficiency of the retorts and appliances, and said the wonder was that they were able to produce 8500 cubic feet of gas per ton of coal carbonized when carrying on the works under such great disadvantages. They were, in fact, thoroughly handicapped, and not only unable to make a larger quantity of gas and a larger profit thereon, but they were unable to supply the gas at a less cost to the consumers, owing to their not being provided with proper apparatus. The proposal was agreed to.

METROPOLITAN GAS COMPANY OF MELBOURNE.

The Half-Yearly General Meeting of this Company was held on the 26th of January last.—Mr. J. Benn in the chair.

The report presented by the Directors stated that the business of the Company was increasing, and that there was no fear of electric lighting interfering therewith. Reference was made to the satisfactory sale of the Company's debentures which took place in London on the 8th of January as a gratifying proof of the soundness of the Company, and the confidence of investors in gas undertakings. The balance at the credit of the net revenue account was £106,756, with which it was proposed to pay a dividend of 9s. per share, amounting to £59,148; to place to the reserve fund £20,000; and to carry forward £27,608. The accounts accompanying the report showed that the receipts from the sale of gas amounted in the six months ending in December last to £233,898; the residuals produced £47,126; and the total receipts were £281,032. The expenditure on the manufacture of gas was £160,419 (£123,835 being for coals); in its distribution, £10,684; management expenses were £12,789; and the total expenditure came to £192,083—leaving a balance of £88,949 to go to the net revenue account. The quantity of coal and cannel carbonized was 88,256 tons; the amount of gas made being 841,779,000 cubic feet. Of this, 778,826,500 cubic feet were accounted for; about 12 million cubic feet being used on the works, and 58,287,000 cubic feet sold under contract and for the public lighting, in which 6143 lamps are employed. The residuals produced were: Coke, 53,323 tons; tar, 965,309 gallons; sulphate of ammonia, 816 tons.

The Chairman, in moving the adoption of the report, said it was specially satisfactory to the Directors that the profits for the latter half of last year would allow of a dividend at the rate of 18 per cent. per annum. He alluded to the strike of coal miners at Newcastle in August last—a difficulty which continued for nearly three months. The Company necessarily found themselves in a very difficult position. Their stocks of coal were not large; and no strike having previously taken place, they could not foresee the final consequences. On the situation being fully discussed, the Directors concluded that to let the gas go out, and thereby cause much inconvenience and loss to the public, was the last thing to be thought of; and it was decided to secure every ton of coal suitable for their purpose that money would buy. Prompt action was taken; and a considerable quantity was purchased in Melbourne, and also to arrive from Newcastle. They obtained some supplies from the coal mines in Queensland, and purchased some Newcastle coal in Adelaide; and as time went on, the high prices brought out coal from some of the small collieries in Newcastle that were not in the Association. Generally they were able to give a good pressure of gas until eleven o'clock at night, after which time it was kept very low in order to make the coal hold out. However, supported by the best energies of their Engineers, they were able to provide gas for use at night, and especially for the public lighting. Whenever the price of coal exceeded 30s. per ton, the Company were allowed to raise the price of gas; and, provided they kept within the regulations of their Act, they were authorized to pay dividends at the rate which could be paid on the price they were charging for gas when the strike took place. For the month of September, the price of gas was raised to 8s. 6d.; but on the average cost of coal for that month, they could, under the Act, have charged 10s. 8d. per 1000 feet. It was, however, decided that the loss, or rather the extra cost of the coal, should not be wholly thrown upon the consumers; and it was only fair the Company should bear a share of the loss. The large holder which was being put up by the Company at the time of the last meeting had been completed, excepting a few castings that were wanted. The Directors expected to have it in operation on the 1st of March. Good progress had also been made with the holder at South Melbourne, of the same capacity—3,000,000 cubic feet. The brickwork for the tank had been completed; and it was expected that the holder would be ready for use in about twelve months from that time. There had not been much expenditure during the half year on the extension of mains to the outside districts; but they had a great increase of business from new dwellings erected within the reach of the mains, which was a profitable feature of the business. The total quantity of pipes used for services during the year 1888 was 568,979 feet, equal in length to more than 10 miles. The issue of £50,000 worth of debentures, bearing 4½ per cent. interest, was placed on the London market, and sold at a premium of £7 1s. 10d. per cent.—a very satisfactory sale. From this source the Company had been provided with capital for their present wants. A paper had been sent with the balance-sheet to the shareholders upon the question of the competition of the electric light with gas in London, showing that gas had nothing to fear from the competition. The argument used applied more forcibly to the general character of the Company's business, with its large and increasing day consumption, than it did to the gas business in London, which was not so favourably circumstanced as they in Melbourne were. In conclusion, he said he thought the Directors saw their way to make a further reduction in the price of gas on the 1st of July next, which would allow the dividend to be increased to 19 per cent. per annum.

Mr. T. Gordon seconded the motion, which, after a few observations from shareholders, was carried.

A vote of thanks to the Chairman closed the proceedings.

Proposed Extension of the Stockton Corporation Gas-Works.—At the monthly meeting of the Stockton Town Council last Tuesday, the Gas Engineer (Mr. W. Ford) submitted a report upon the subject of extending the gas-works. The present make of gas is 250 million cubic feet per annum; and this is the capacity of the existing works. On the recommendation of the Gas Committee, the Council agreed to increase the retort power at an estimated cost of £3500.

Rotherham Corporation Water Supply.—At the meeting of the Rotherham Town Council last Wednesday, the Water-Works Committee recommended that alterations and additions at the central pumping station should be carried out at a cost of about £1200, and that the necessary specifications be prepared by the Manager and submitted to Mr. Mansergh, C.E., with a request that he would let the Committee have any suggestion he might think advisable thereon. Mr. Habershon said since the Committee met he had looked into the matter; and he thought there were several points which ought to be brought before the Committee. He would not go into details, but would simply move that the recommendation be referred back. After a brief discussion, this was agreed to.

Liverpool Corporation Water Supply.—The abridged abstract of estimates of the income and expenditure of the Liverpool Corporation for 1889, prepared for the Finance Committee by the City Treasurer, has been lately issued. The computed income of the Water Committee is placed at £148,580; and the expenditure at £153,746. It is estimated that the Water Committee will also incur "extraordinary" expenditure to the amount of £136,151. On the capital account it is calculated that £21,900 will be required for the extension of old works, and £129,984 for the formation of new works. From this a credit balance of £15,733 15s. has to be deducted; leaving the amount to be borrowed on security of the water account, as mentioned under "extraordinary" expenditure, at £136,151.

EAST LONDON WATER-WORKS COMPANY.

The Half-Yearly General Assembly of the proprietors in this Company was held at the Offices, St. Helen's Place, E.C., on Tuesday last—Mr. A. W. Gadesden, J.P., D.L., in the chair.

The Secretary (Mr. I. A. Crookenden) read the notice convening the meeting; and the report of the Directors and statement of accounts (an abstract of which appeared in the Journal for the 26th ult.) were taken as read.

The Chairman: In moving the adoption of this report, I am very glad to be able to say that, notwithstanding the discouraging statement which appears at the head of our report—viz., that there was a decrease in the revenue of the half year, the increase in our customers, as shown by the number of our domestic supplies, continues quite satisfactorily. In fact, the figures come out as follows:—The increase in domestic supplies was 3266 in 1887, and in 1888 it was 3204. The difference therefore is quite inconsiderable. There is a loss, which is stated in the report, with respect to road watering. That is a loss on the year which has nothing to do with the domestic income of the Company; and with drier seasons we shall have a return of our income for road watering. The next statement, with reference to the decrease in the expenses, requires some explanation. This is more apparent than real. You will see that this is a comparative statement; and it does not follow that we have any material decrease in our present half-year's expenditure. This half year, however, they compare with an unfortunate half year—that of the Christmas half of 1887—when the expenditure was materially increased by the drought which we then suffered from, and which, of course, increased our pumping expenses. We also had in that half year to meet a very heavy law bill, and other expenses for repairs, and matters of that kind; and we had a big breakdown in our Thames main. All this tended to swell the expenses of that half year, and to make them compare unfavourably with those of the present six months. However, the expenses this time are moderate; and we have, in addition, a credit coming to reduce our expenditure account, as it were, amounting to something like £2000, which we were owed by the Metropolitan Board for the fixing of hydrants, the expenses in connection with which were incurred mainly in the previous half year. I have disposed of the first two paragraphs of the report; and now come to the third, in which we state: "The well, engines, and works at Waltham are most successfully completed." This is scarcely forcible enough to show what a great success really has been achieved. The works have been successfully completed, as stated, owing in a great measure to the ability of our Engineer. They are perfect in all respects. The engines are doing most admirable work. The boilers are everything we could desire; and altogether they have gone to work without any hindrance of any kind. The engines are now pumping into our reservoir at High Beech against a very heavy lift—330 feet; and they are working that most admirably, and do it without any difficulty. We have, in fact, had nothing but gratification in the great success of the works. So far everything has gone on well; but that does not represent half the success which we have met with in the sinking of this well at Waltham Abbey. We have met with a most abundant supply—much beyond our expectations—of most beautiful water. Now, supposing that our two other wells—the one at Lea Bridge, and that at Walthamstow—give as good a supply of water as we have met with at Waltham Abbey, we shall be in a most comfortable position, as we shall then have anticipated the increasing wants of this great Company for certainly ten years; and in the judgment of our Engineer, there is no reason why we should not get as good a supply at these two other wells. If so we shall have achieved a great success indeed. I will ask you to go back to the October meeting of 1887, when we had to report to the shareholders that, owing to the drought then existing, and to the possible continuance of that drought, the Directors deemed it advisable to revert in part of their district to the intermittent system of supply, fearing our water might not otherwise last out as completely as we could desire. There was some anxiety at that time as to the supply; and the anxiety was not confined to ourselves, because the Government Water Examiner, General Scott, became very anxious also. Those who have read General Scott's statement in his last year's report to the Local Government Board, will have seen that his anxieties were still very great; for he expresses his fears lest this Company should be in a serious position in a few years' time, owing to the demand for water overcoming the supply. He states a suppositious case in this way: Supposing that the winter of 1890 should be a dry winter, so that the Company would be unable fully to fill up their large impounding reservoirs, and supposing that the summer of 1891 should also be dry, then he fears that the Company would be placed in a very difficult position. Well, now, the success that we have met with in sinking our wells in the Lea Valley, must of necessity have set all these fears and anxieties of General Scott at rest altogether, because, as I said before, we have met with an abundant supply of water, which will satisfy the increasing demands in our district for some years to come. This, I think, is the most satisfactory feature in the history of the Company. The next paragraph in the report, though not so important as that to which I have just referred, is still important in its way. It refers to the disposal of our Old Ford works, and the concentrating of our pumping operations mainly at Lea Bridge. There are several reasons why this is very desirable. For some time past our conduit main, which brings the filtered water from Lea Bridge to the Old Ford works, has been getting inconveniently small; so that at times, when we have had great demands for water, we have found a difficulty in supplying the engines with a sufficient quantity through this conduit main, and the time was near at hand when we should have had to consider seriously the question of putting down a new main or of assisting the present one very materially. Another reason why it is desirable that we should make this change is that by that means we shall concentrate our work more materially. Though we have had this desire for some time past, yet it was only the opportunity of finding in the Midland Railway Company a purchaser for our property that we were enabled to look it in the face. Although we have not obtained so large a price as we could have wished—I suppose no one ever does when he sells his land—we have obtained a fair amount of money from the Midland Railway Company for this property; and this money, together with a further £10,000 or £12,000, it is thought will suffice for making this great and important change. Perhaps the shareholders would like to know in what respect the change will benefit the property of the Company. First of all it will reduce our coal bill, because we shall be able to provide ourselves with a better class of engines than at present, more modern in their application, and still better suited for the purpose that we have in hand. Then we shall also save in rates, in superintendence, and in wages, because we shall be able to do the work more economically and in a concentrated way with fewer men. The Engineer estimates that the saving we shall make will be from £3000 to £4000 a year. Although it may be said that this is only an ideal saving, yet we have had that experience of our Engineer which enables us to trust implicitly everything he says, because we have proved that in all the estimates he has given us up to the present time, he has been able to fulfil his promises and statements to us; and we are therefore looking forward with confidence, when this change is made, to effecting a saving in the expenses of the Company of about £4000 a year.

I do not think there is anything else to notice except the question of the quality of the water we supply; and we state in the report that the whole of the water we delivered was certified as "pure and well filtered." In the report of Messrs. Crookes, Odling, and Tidy to General Scott, dated the 7th of March, it is stated, referring to the Thames-derived water, that the amount of organic carbon present in 100,000 parts of water was found to be 0·170 and 0·167 part respectively. Then this report states that in the case of the East London water, the mean amount of organic carbon was found to be 0·145 part in 100,000 parts. Therefore we stand something like 10 or 12 per cent. better in quality with respect to organic carbon than the Thames-derived water. There is one point that I omitted to state. The supply of this chalk water from the Lea valley must of necessity still further improve the average quality of the water we generally supply to our customers. To show the enormous amount of water supplied by this Company to the public, I may mention an interesting statement that has been furnished to me by the Engineer. He says that the Company every day lifts a weight of water equal to the average weight of four million people to a height of 130 feet; and that this volume of water would suffice to fill a canal 20 miles long, 20 feet wide, and 3 feet deep. That is a great fact, and will convey to you some idea of the gigantic supply of water with which we have to deal—it is really a much larger quantity than that of any other Company. The last matter I have to refer to is one which I dare say will be very gratifying to the shareholders—viz., that we are able to recommend an increased dividend, at the rate of 7½ per cent. per annum for the half year. I think you will see that the report on the whole is gratifying. We give you a present advantage, and a prospective one in the increased savings of the Company in their annual charges when the new works are completed; and we also place before you and the public the very gratifying fact that we have secured—as we trust we have done—an ample supply of water for the future great needs of this very large Company. The resolution which I now have the pleasure to propose is—"That the Directors' report and accounts submitted to this meeting be received and adopted, and that, as recommended by the Directors, a dividend of £3 15s. per cent. (less income-tax) on the ordinary stock of the Company be declared payable on the 9th of April."

Mr. H. Dalton seconded the motion.

Mr. Jennings said he assumed that the supply from the chalk did not require filtering; and that it was ready for immediate use.

The Chairman: Yes.

Mr. Bryan, in further reply to Mr. Jennings, said that at Waltham Abbey there was London clay—about 70 feet altogether; but there was no London clay at Lea Bridge.

Mr. Jennings thought it was most satisfactory that they were increasing their supply from the chalk, as the greater the supply they obtained from that source, the better would the public be satisfied. He supposed that no further information could be given to the proprietors as to the Bills in Parliament, to the introduction of which reference was made in the Directors' report; and he assumed that they could not say whether the County Council would take the water supply out of the Companies' hands. The law and parliamentary expenses, in the capital account, amounted to a very large sum—£8000 this time and last.

The Chairman: £800. The amount stated in the capital account refers to the expenses for some years.

Mr. Filliter (formerly Assistant-Engineer to the Company) desired, having been connected with the Company for 43 years, and having had great experience in constructing water-works, to express his belief that the Directors, with the help of the Engineer, had made a most excellent stroke of business in finding water in the chalk. As had been pointed out, water from the chalk would not require filtration—a fact which in itself was satisfactory.

The resolution was then carried unanimously.

On the motion of Mr. W. Bird, seconded by Mr. Jennings, the retiring Directors (Messrs. H. Barnard and R. B. Fenwick and Captain H. Davis, R.N.)were re-elected.

Mr. Filliter then proposed the election as an Auditor of Mr. F. Tendron, F.C.A., in the place of Mr. Baddeley, who resigned, on account of failing health. He was not personally acquainted with Mr. Tendron; but the reputation of that gentlemen in connection with accounts stood very high, and as a Director of a West End Water Company, he would bring a considerable amount of experience to the Company.

Mr. Jennings, who said he had known Mr. Tendron for a great many years, seconded the resolution, which was carried.

On the motion of Mr. Bird, seconded by the Chairman, a vote of thanks was passed to Mr. Baddeley, whose services to the Company were warmly recognized by both speakers.

The motion was carried unanimously.

Mr. Tendron, in returning thanks for his election, incidentally observed that, although chalk might underlie London, one could not reasonably expect to find water merely by sinking wells. He thought that those connected with the Company might congratulate themselves that their Engineer had found water where he had sunk the well. No doubt there were persons in favour of chalk water against river water; but there were other authorities who believed no water supply was better, properly filtered, than that obtained from the tributaries of the Lea and Thames, and that it was a mistake to suppose the whole of London could be supplied by sinking a number of wells in the chalk. The Chairman had given them an idea of the large quantity of water that was daily supplied by the Company; but there were no fewer than eight Companies whose efforts were constantly devoted to the question of how to supply the present and future needs of the Metropolis in regard to water. If the County Council acquired the Water Companies' undertakings and consolidated them, he doubted whether the public would be better supplied; and it was a very great question whether there would be any economy at all.

Mr. P. D. Tuckett, in proposing a vote of thanks to the Chairman, Directors, and officers of the Company, pointed out that, after all the years during which they had been working, they were now only enabled to pay a dividend at the rate of 7½ per cent. per annum. The Directors had issued stock at 194; and the return on that capital was only about 3¾ per cent. He believed that the present position of the Company had been attained only by the most careful management.

Mr. Jennings seconded the resolution, and it was carried unanimously.

The Chairman, in returning thanks, assured the shareholders, on the part of the Directors and the officers, that in the future, as in the past, every effort would be made to improve the position of the Company.

The Darwen Corporation Gas Sub-Committee have decided to recommend the Council to substitute larger mains for the present small ones in certain parts of the borough, at an estimated cost of £1476.

The Directors of the North-Eastern Railway Company are making arrangements for lighting their carriages with Pintsch's oil gas. The necessary works for the production of the latter have been constructed at Newcastle; and some trains fitted with the needful appliances.

THE MANAGEMENT OF THE SALTLEY (BIRMINGHAM) GAS-WORKS.

Reply of Messrs. Bloor and Granger to the Gas Committee's Report.

The following communication, with reference to the report of the Gas Committee of the Birmingham Corporation on the result of their investigation into the charges made in regard to the management of the Saltley Gas-Works (which was given in the Journal last week), was sent to the City Council on the 30th ult. by Messrs. Bloor and Granger:—

We beg to submit the following observations upon the report of the Gas Committee to be presented at the meeting to be held on Tuesday, April 2. In doing so, we have to acknowledge the large share of attention and time which the members of the Committee have given to this inquiry, as well as the courtesy with which we were received. But, while fully recognizing their efforts to obtain knowledge of the true state of the case, we claim the liberty to differ in opinion from many parts of the report, and from the conclusions arrived at. In our opinion, the evidence heard during the five days of the inquiry, substantially proves the accusations which were made. It may be also mentioned that these accusations were made in open Council meeting only after the Chairman of the Committee had been informed of the major portion of them, and his refusal to postpone the motion for the advance of the Engineer's salary. It is impossible, without submitting the full evidence, to fully demonstrate the erroneous conclusions of the Committee; but it is thought that the following statement will receive your careful consideration.

The manner of statement of the intimation by Councillor Bloor at the close of the third day's inquiry is misleading. The report says that "he did not think that further light could be thrown upon the subject by the examination of others, and did not propose to produce further evidence unless it was desired." The offer was made in compliance with the expressed wish of the Committee, and especially of the Chairman, whose proposed holiday had been postponed through this matter, to shorten the inquiry as much as could be done consistently with justice; and was made conditionally on the Committee being satisfied with the evidence which had been produced, and reserving the right to afterwards call rebutting testimony.

At the commencement and during the inquiry, we asked for the production of the documents in possession of the Committee bearing upon orders for reduction of wages, deductions, and fines; but these were refused. The accuracy of the statement in the report as to deductions and fines we dispute. We understood it to be admitted that these deductions could not be ascertained otherwise than by going over the wages-books, and tracing them item by item, as no separate account had been kept of them. They had been made arbitrarily, and went into the ordinary funds of the department.

As to the reduction of the wages of the engine-drivers (three), the statement in the Committee's report may be supplemented by the information (as given in the shorthand writer's notes) that these men had previously applied for an advance of wages; and it seems remarkable that, if the increase given was a mistake, it could have been possible for the payments to be continued from May 3 till Feb. 6 without detection. The Assistant-Engineer in his evidence said: "There was a question brought up by Mr. Wareing (timekeeper) as to how these men were to be paid, by turn or weekly; and Mr. Hack said they were to be paid at 5s. a turn, which would be 35s. a week. . . . I always stuck to this—that Mr. Hack must have known about it, because the wages-book came up every week since May 3." The timekeeper says he "could not have misunderstood Mr. Hack's orders." As to Councillor Bloor's lack of explanation complained of under this heading, if the Committee turn to the evidence given by Edwin Smith, on the 9th of March, they will find that Mr. Bloor said: "The proposition was made to them to submit to 6s. below the average wage [three men in place of two]; and I advised them not to submit to it."

As to the effect of the work upon the appearance and duration of life of the men (4), the figures supplied in the Sick Society's report speak for themselves. In the Council House Gas Department in 1888, 137 *employés* contributed £168, and received in sick allowance £50; in the Saltley works, 390 men contributed £412, and received £465. The Committee have in their possession the written opinions of the medical officers.

As to the statement that within the last month ten or eleven men had left the works *en bloc* in consequence of ill-treatment (1), it is frankly admitted that this was made under misapprehension of the date and circumstances; and the Committee's report correctly describes the matter. Only two men were discharged on this special occasion. But there were other incidents of a somewhat similar character. Henry Simpson, in his evidence (March 15), says some half-a-dozen men left previous to Christmas on account of the iron barrows, to the introduction and use of which the witnesses concurred in attributing the many coke fires (large and small) which had happened, and for which men had been fined or discharged. Two years ago a dispute occurred as to the quantity of coal put into the retorts. William Roddis (March 6) said he had been twelve years stoker at Saltley. Twenty-eight men left the works over this. "I was fined and discharged, and ordered never to come on the ground again. . . . I believe in the office our names were posted up never to be employed again."

As to reduction of wages (5), it was given in evidence by representative coal-wheelers (34)—*e.g.*, Wm. Bignall, March 15, that "when we are wheeling to the shoots, we have 4s. 10d. for 43 barrows; we used to have 5s. for 42." It is true that these men are nominally under contractors; but these latter have no signed agreements with the department, and the men are bound to obey the orders of the permanent foremen, independently of the contractors, and are discharged at will by the Engineer or his assistant. As to the pipe-jumpers (20), on behalf of the others, John Owen (March 6) says at one time they had 4s. 6d. a turn; it was reduced to 4s., because there were plenty of men "on the bridge," and this winter they got it up to 4s. 3d. As stated in the Committee's report, there have been individual cases of reductions of wages; and the total number stated by the witnesses seems to be much in excess of that given in the report.

Increased and excessive work was spoken to by a crowd of witnesses. The stokers say their quantity of coal for each retort has been increased since the transfer of the works from 5 to 6 cwt.; and this makes 17 cwt. more a day for the same money. The increase of work came on with the introduction of the regenerative furnaces and brick retorts. One witness (Robert Toller, March 9) says the work is now 50 per cent. harder than under the Company; and this seems to be substantially confirmed by others. The nature of the work was so bad in the autumn of last year that a letter was sent by the men in No. 3 retort-house to the then Chairman of the Committee (Councillor Bishop), complaining of the general state of things. This letter was put in evidence, and is as follows:—

We, the workmen of the Saltley Gas Department, wish to warn you against the state of things at these works. We would advise you to make inquiries at once. We think Mr. Morrison, the super., is not at all qualified for the office he holds. The men are treated and spoken to as if we were dogs under him. Also, Mr. Brown chief foreman, had no practical knowledge of gas-works before his appointment to office. We think there should be more practical men appointed over us. Some of us have known the works since they have started; but we never knew them in such

a state as at present. One-half of the retorts at present supposed to be at work cannot be worked for choked pipes and for want of men. Had the weather been bad this past week, some part of the town would have been in darkness. If you think this letter a mere scare, come to No. 3 retort-house and ask your retort-house foreman how the work stands for the winter months. The men are getting very dissatisfied; and if something is not done soon for them, it will certainly be brought before the ratepayers, and gas making will come to a stand at these works. Thousands of pounds have been wasted through bad management. We are, yours respectfully, THE GAS STOKERS.

P.S.—If no notice is taken of this, it will be published.

Pipe-jumpers, coke-wheelers, firemen, and others, all agree that extra work has been forced upon them. "The work is more oppressive; the foremen swear at them and drive them—they are not treated like men." Samuel Ford (March 15) was asked, "Did you ever see a man so worked that when he went to take a drink he could not lift the bottle to his mouth?" The startling answer was: "Yes, I have, many a time."

As to general tyranny (7), it is submitted that much of this has been proven; and we cannot concur in the opinion of the Committee that the complaints have chiefly affected the subordinate officers, who have occasionally exceeded their orders. The argument is untenable that the responsible individual can shift his responsibility to others by professions of ignorance as to what is being done. The Engineer has accepted the position and pay of responsibility; and he should be held accountable. Much has been said by the Chairman of the Committee as to the right of appeal to Mr. Hack against injustice. But in the majority of instances the witnesses seem to have been under a very different impression. They "never had the thought of appealing to Mr. Hack; it was not generally understood. If there was any grievance, they had to appeal to the Under Manager." The usual answer to remonstrances is said to have been, "If you don't like it, leave it." Notes of one or two of the cases are given. Joseph Bloom, purifier, after working his day of 12 hours, was told by the Assistant-Engineer that he was to go on all night to wheel coke. He said he was not able to do so, and did not. The contractor under whom he worked was ordered to discharge him. Bloom saw Mr. Morrison, reasoned with him, told him that he was physically unable to do such hard work for 24 hours in succession as wanted, that his father was out of work, and his mother was ill, and he did not want to be out of work. He was kept out for a fortnight, and was permitted to resume only on the condition that he should not again refuse to go coke-wheeling after his usual day's work. On this case, the following colloquy between us and Mr. Morrison took place: "Do you think it unreasonable to ask men to work for a stretch of 24 hours without giving them some monetary advantage, and are you expected to use the same kind of conduct towards these men and towards other men?" "If we are absolutely short of men." "Can you tell us in how many cases (about Christmas time) you had to compel men to work the night shift?" "Forty or fifty, I should think." Admittedly the men only comply through the dread of dismissal.

Joseph Allen, stoker, had a child dangerously ill. On a Thursday night he told the foreman that he might want a note to leave the works to see his child ere it died. He was not sent for; but next night he was. He was refused permission to leave the works; and the child was dead before he reached home in the morning.

Joseph Bedman and others left the works through a dispute, went to the Beckton Gas-Works, where they were told by the foreman that they could not find work there, as orders had been received from Saltley, from Mr. Hack direct, that they were not to be employed; but he gave them a sovereign to help them on the road. Bedman went a year or more afterwards to stoke at Saltley, at the request of Mr. Shoubridge, the Works Manager; but after a month Mr. Hack discovered that he was on the ground, and ordered his immediate dismissal. Bedman went to Swan Village, and was engaged to work there; but the day before he was to enter, he received a letter from Mr. Allen saying that orders had been received from Mr. Hack that he should not be allowed to start. He is now employed at Windsor Street. William Roddis says he gave up foremanship because he would not bully the men according to orders. Charles Lapthorn says men were frightened to complain to Mr. Hack; and others recount like experiences. Stephen Wood says that his time, when it exceeded 72 hours a week, was not paid for at the time, but was carried over from week to week; and on one occasion, in pressing need, he applied for the full wages due to him, and was refused. These are given as specimens of the general drift of evidence, and are by no means exhaustive.

In his evidence the Assistant-Engineer ascribed many of the difficulties met with to the scarcity of competent men; and yet within the past few weeks a number of experienced stokers were, with the consent of the Engineer, induced or permitted to leave Saltley for Halifax, to supplant some men in the gas-works with whom there was a labour dispute.

It is true that the Committee had previously to this inquiry proposed certain improvements in the mess-room arrangements, &c.; but they might have added that these alterations had been first urged upon the Committee by us, and that at the time of the inquiry they had not been carried into effect. The adopted plan for regulating the amount of coal was asked for two years ago, then refused; and the strike already referred to resulted. But will the improved system be continued?

The report says that "the inquiry has furnished both the Committee and the Engineer with some useful information on this subject." To us, it seems as if the inquiry all round must have been of the nature of a revelation to the members of the Gas Committee. Some of the evidence given cannot be permitted to rest where it is, especially those portions of it referring to the quality of gas manufactured, and the processes of manufacture.

We are glad to be informed that this inquiry has already produced good results in the treatment of the men employed at these works; and we shall be satisfied if this better state of things is continued and improved upon. Our part will be to exercise vigilance.

THE CHARGES BEFORE THE CITY COUNCIL.

At the Meeting of the Birmingham City Council on Tuesday last—the MAYOR (Alderman Barrow) in the chair—the report of the Gas Committee above referred to, together with the foregoing statement in reply thereto, were under consideration.

Alderman POLLACK, in moving the adoption of the report, said the Committee met at Saltley five times to investigate the charges made by Messrs. Bloor and Granger. Altogether, the names of 70 witnesses were supplied by Messrs. Bloor and Granger; but some of them could not be found. However, 61 witnesses were examined, some of whom were no longer employed at the gas-works, some were now at Windsor Street, and the majority were working at Saltley. Every facility was given for the examination of witnesses, who were informed that they could speak fearlessly, as it was necessary to hold an inquiry. No witnesses were called by Mr. Hack; but the Committee called the Assistant-Engineer, Overton (the foreman), and Brown (the yard foreman). The Committee's conclusions were unanimously arrived at, and were embodied in the report; but no abstract of the evidence was added, because it might have been considered one-sided. Referring to the question of long hours, he said that when the stokers, for example, were stated to work 12 hours, this was not exactly the case. They were on duty 12 hours; but each hour of work was succeeded by an hour of rest. The work of the firemen was more continuous; but it was not so arduous as that of the stokers. In addition to these men, about 15 others made very long hours. They were the valvemen, engine-drivers, boiler attendants, gate-keepers, and watchmen, who worked on an average 71, 73, 80, and 82 hours per week. There were nine such men at Windsor Street, four at Adderley Street, and five at Swan Village; and they worked the same number of hours under the old Companies. The work in those days, in fact, was considerably heavier, because at that time the men had to work on Sundays, and sometimes 24 hours continuously. Their pay had been the same during the last few years; but it was higher than was received under the old Companies. The Committee went very carefully into the matter of reductions of wages. The books during the last two years had been searched; and it was found that the fines inflicted in 1887 amounted to 18s. 8d., and in 1888 to 35s. 3d. Stoppages in wages from defective or short work in 1887 amounted to £2 0s. 4d. A strike was on at the time; and the stoppage was due to this circumstance. The number of men whose wages had been reduced during the past two years was 16, and the amount reduced was £3 12s.; but the men received an increase in the following season—reductions being made in the transition from summer to winter work. The increases during the two years numbered 48, as against 16 cases of reduction. The weekly amount of wages increased was £7 3s. 6d.; showing a balance of £3 11s. 6d. weekly over reductions. Complaints were made that the work was heavier than it used to be; and this was looked upon as a reduction of wages. The increase of work dated, according to the witnesses, from the time of the introduction of the regenerative furnaces; but this was six years ago. The work during the last six years had been practically the same; and until recently no complaint had been made. It was clear, however, from the evidence, that the men had found the work had increased, and the attention of the Committee would be directed to the matter. The Committee desired to pay a fair day's wage for a fair day's work; and he was sure the Council wished to do the same. It could not be denied that the work in the retort-houses was arduous; but there were no traces of the men being overworked. It should be considered that, to compensate them for the severe nature of the work, the Council had granted them a week's holiday. It should be borne in mind that it was necessary to employ double the number of hands in the winter that were required in the summer, and consequently at the close of the winter season a large number of men were discharged or shifted from one occupation to another; and if they received less wages at another kind of occupation, it could not, under the circumstances, be regarded as a reduction, but only as an alteration. Proceeding to criticize the statement issued by Messrs. Bloor and Granger, he said there were two matters of a personal character in it, which, however, were not sufficiently important for him to detain the Council upon. As to the assertion in the first paragraph as to the "accusations being made in open Council meeting only after the Chairman of the Committee had been informed of the major part of them, and his refusal to postpone the motion for the advance of the Engineer's salary," the fact was he was only informed by Mr. Bloor of his intention to move an amendment to the proposal to raise Mr. Hack's salary when he (Alderman Pollack) went to the Council meeting. His withdrawal of the motion under such circumstances would have been equivalent to his wishing to hush up something which ought not to see the light; and to this he would be no party. The other matter was the suggestion that he wished, after the third day of the inquiry, that no further evidence should be called, and that the investigation should be shortened because of his "proposed holiday." His holiday was never in question; and he need hardly assure the Council that it would never stand in the way of his fulfilling the duties he had undertaken. The Committee were certainly desirous of not unduly prolonging the inquiry; and when, on the second day, a number of witnesses were called who stated that they had nothing to complain of, it was submitted to Messrs. Bloor and Granger that they should reconsider the number of their witnesses. But Mr. Bloor wrote and placed the onus of this on the Committee. Mr. Hack also submitted that the withdrawal of these witnesses might lead to the inference that he did not wish them to be questioned. With reference to the production of documents bearing upon the reduction of wages, &c., the Committee clearly stated that documents would, if required, be produced in reference to any charges that might be made where documents would elucidate them. During and since the inquiry, the books had been searched in reference to fines, reductions of wages, &c.; and the figures mentioned in the report, and those he (Alderman Pollack) had quoted were the result of such search. These figures might be relied upon by the Council as absolutely correct; and they were the best answer to the charge of reduction of wages. As he had already stated, the Committee abstained from giving any abstract of the evidence of the witnesses, because any abridged statement, although it might be made with the best intention of being impartial, was subject to being one-sided. For this reason it was to be regretted that Messrs. Bloor and Granger, in their statement, mentioned names, and gave portions of evidence which in many cases were absolutely misleading and inaccurate. The so-called reduction of wages of the two engine-drivers, to which reference was made by them, was very fully explained in the report of the Gas Committee. As Mr. Hack did not regularly examine the rates in the wages-book, this duty fell to the Assistant-Engineer; and as the latter had misunderstood Mr. Hack, and believed that the men should receive 35s., the error had only been discovered recently, when both Engineers were requested by the Committee to prepare a comparative list of the wages paid at the Windsor Street and Saltley works. That the mistake was not found out sooner was to be regretted; but, at all events, the delay in its discovery was of no disadvantage to the men, who for several months received 35s. instead of 30s. per week. Then in the paragraph dealing with the effect of the work upon the appearance and duration of life of the men, he was not aware there were any gas-works at the Council House; and the comparison of Saltley with the Council House would strike every one as being, to say the least, very peculiar. Why did not Messrs. Bloor and Granger compare the Saltley works with the Windsor Street works? The comparison would have been fair, and would have shown a very different result, and one that could not be misleading. Moreover, the analysis of the cases of sickness proved that the majority of them did not arise in connection with the men employed in the retort-houses, but with the men working in the yards and in the streets. The opinions of the medical officers alluded to referred to gas-works generally, and not to the Saltley works; and these opinions, as was often the case with those of medical men, differed considerably. He would say nothing as to Mr. Bloor's charge, made with such dramatic force at the Council meeting on the 19th of February, that within the previous month ten or eleven men had left the works *en bloc* in consequence of the ill-treatment they had received, as Mr. Bloor had frankly admitted that it rested upon misapprehension. Coming to the next paragraph, he (Alderman Pollock) had already fully dealt with the question of the general reduction of wages, and explained what this amounted to. He would like to know if

there were any other works of the same magnitude in the town wherein so insignificant an amount of reductions had taken place, each of which was explained by special circumstances, and at the side of which there had been increases of wages which far outbalanced the reductions. Then as to the increased and excessive work stated to have been spoken to by a "crowd of witnesses." All he could say about Toller was that he was a foreman of stokers, from which position he was discharged some years ago. With respect to his evidence, it had been, especially in one important particular, of the most contradictory nature. The statement quoted, that the work was now "50 per cent. harder" than it was under the Companies was absolutely untrue, and was disposed of by subsequent witnesses. As to the stokers' letter, it did receive attention. With regard to the question of the occasional long hours, mentioned by Bloom, this had been fully explained in the Gas Committee's report. Then as to the case of the stoker Allen, whose child was dangerously ill. Messrs. Bloor and Granger knew perfectly well, from this witness's evidence, but they omitted to state it, that when he applied for permission to leave the works, he did not give any reason for his application, nor did he do so when the foreman declined to give him the order he wanted. On learning the facts, the foreman at once expressed regret to Allen, whose reticence alone was the cause of his trouble. With reference to the men who left the works owing to a dispute, the evidence of Bedman did not support the statement that, when he applied for a situation at Beckton, a letter was received there from Mr. Hack not to employ him. What he said was that he supposed the letter was from Mr. Hack; but the fact was that Mr. Hack never wrote at all to Beckton. The circumstances of the case were as follows:—When West's stoking machinery was introduced at Saltley, the work was superintended by one of West's engineers. Bedman was employed at this machinery, but struck work, and was the ringleader of a strike, inducing the other men to leave with him. West's people erected at the same time stoking machinery at Beckton; and when Bedman applied there for the same kind of work, Mr. Carpenter, the Engineer employed there by Mr. West to superintend the machinery, had been informed by his colleague at Saltley what had happened there. Then there was a statement that one of the foremen at the Saltley works (Overton) had given evidence to the effect that "he was driven, and had to drive others." This was a gross exaggeration of what Overton actually said; and, as a matter of fact, all the stokers spoke highly of Overton as one of their foremen. Whatever might be the inference Messrs. Bloor and Granger drew from the evidence given at the inquiry, there was nothing clearer in the minds of the Committee than that Mr. Hack was not guilty of the charges brought against him. Mr. Hack had been employed at the gas-works since 1872, first as Assistant-Engineer and afterwards as Chief Engineer. He had always borne a very high character for ability and discipline; and during his 17 years' service, 13 years of which had been since the transfer of the works to the Corporation, the Committee had not received any complaint whatever against him. Certainly the evidence had not proved that he was harsh. On the contrary, it showed very clearly that he was anxious to remedy any complaints that were made to him. Of course, it might be said that he was responsible for any acts of mismanagement by his subordinates. That was so, no doubt, to a great extent; but very few cases of hardship, due to the indiscretion or over-zeal of some of his assistants, had been proved by the evidence. There were a few—half-a-dozen, if as many—but none of the serious character shadowed forth at the commencement of the inquiry. They had to bear in mind that there were 600 men employed at the gas-works in a great variety of occupations, and that some of them left without notice, which rendered the work of the Gas Department very difficult indeed. The efficiency of the work was vital to the interests of the town; and it could only be maintained by strict discipline. Taking into consideration the magnitude of the works, he was astonished that there were so very few complaints, many of which were of a most trivial character. In February last measures were taken by the Committee to come into closer contact with the men; and the inquiry proved the men were not aware that they could appeal from the action of their foreman and the Assistant-Engineer to the Chief Engineer or the Gas Committee. This had now, however, been brought to the knowledge of the men; and he trusted that more complete harmony would be the result in future. There was no reason to suppose that the Committee was not as anxious as other members of the Council to look after the welfare and comfort of their workpeople.

Mr. BISHOP seconded the motion, and explained that, when he was Chairman of the Gas Committee, he received many letters, some of which were anonymous, and could not be answered. One, however, referred to by Messrs. Bloor and Granger in their report as having been received by him from the stokers, was attended to; and it was found that there was no tyranny on the part of Mr. Morrison, nor any excessive work, except when unavoidable, as stated in the letter.

Mr. BLOOR said he did not intend to propose an amendment, and should content himself with opposing the resolution. He urged that the Chief Engineer should be held responsible for the acts of his subordinates; and then complained that when he and Mr. Granger asked for the production of documents, which in their judgment would prove their case, the Committee refused, although it was clearly stated by one of the witnesses that documentary evidence could be produced. He contended that it was proved that many of the men worked an excessive number of hours, and that wages had been reduced; instancing the case of the coal-wheelers, whose average earnings last winter were 2s. a week less than the previous year. On the question of general tyranny, he said the Chairman, in his remarks, seemed to explain that it was so infinitesimal that it required a powerful microscope to discover it. But he (Mr. Bloor) wanted to know whether compelling a man to work 24 hours in a hot furnace, and telling him he would have to go if he did not do it, was not tyranny. He supposed they would call it slight pressure put upon the man by an official to accomplish a certain end. With regard to appeals to the Chief Engineer, he said a man felt it was no use making a second appeal when he had previously been turned away. His (Mr. Bloor's) object was not even to slight the Committee, but to defend the men. Believing he was right, he should oppose raising the salary of Mr. Hack to the end of the chapter; and he should oppose the adoption of the report, because he believed it to be contrary to the true facts of the case.

The MAYOR then called upon Alderman Pollack to reply; but

Mr. GRANGER, rising amid laughter, exclaimed "Oh, no." He said they would see from the statement Mr. Bloor and he had made that they entirely differed from the Committee as to the results of the evidence. The Committee said plainly they did not think the charges proved; but he believed honestly that substantially they were proved up to the hilt. He could scarcely help admiring the power of evasion on the part of the Chairman, especially with regard to the refusal to produce documents. He and Mr. Bloor found that there was a wide difference between them and the Committee respecting what were called fines. If a man had 2s. a week struck off his wages for some supposed fault, they called it a fine; but the Committee only called it a reduction of wages. In almost the very smallest manufactories such fines went into a sick fund; but the Gas Committee seemed to apply them towards paying the salaries of the officers. The coal-weighing was a matter that had been productive of disturbance after disturbance. The men asserted that while the coal was not weighed, the quantity increased until it became intolerable. During the time the inquiry had been on, it had been weighed, much to the advantage of the men; but no sooner had the inquiry ceased, than the weighing of the coal also ceased. He quoted the case of the man Bedman, as mentioned in the communication they had made to the Council, as a case of tyranny that had been proved. What was chasing a man from works to works, and preventing him getting employment, but tyranny? He contended that the use of iron barrows had proved a burden to the men, and a failure from a financial point of view. He also severely criticized the methods of testing the gas, and suggested that, as the Magistrates appointed the Examiner, they might look after the matter. He considered they had fairly proved their case in their statement; and he asserted that the *employés* in the gas-works had been tyrannically used, and not treated as well as the men in other gas-works.

Mr. BEALE supported the Committee's report, quoting various cases from the shorthand note of the inquiry in support of his contention.

Mr. LANCASTER also supported the report, at the same time expressing his opinion that the inquiry had been justified by the disclosure of certain things which required looking into.

Mr. WALTER opposed the report, and contended that the Committee could not clear Mr. Hack's character from the charge of tyranny which hung over him. He argued that the system of letting the work out to sub-contractors meant "sweating."

Alderman COOK said that, after reading the report of the Committee, he was bound to think that Mr. Hack had come off victorious with respect to the charges made against him. He hoped, however, that one result of the inquiry would be that the Committee would be better acquainted with the details of the work at Saltley.

The MAYOR observed that he went into the inquiry with every determination to thoroughly investigate the matter; and whilst he confessed there were some things which required alteration, he could not admit that the charges of tyranny had been made out against Mr. Hack, who seemed to be a man determined to do his duty, and ready to listen to any complaints.

On the motion being put, it was carried by 40 votes to 4.

Alderman POLLACK next moved—"That in accordance with the recommendation contained in the report of the Gas Committee, presented to the Council at their meeting on the 19th day of February last, the salary of Mr. Henry Hack, Engineer at the Saltley and Swan Village Gas-Works, be increased from £900 per annum, with an allowance of £50 per annum for house, to £1050 per annum, inclusive of allowance for house; such increase to commence and be computed from the 1st day of July, 1888."

Mr. W. F. GREEN seconded the motion.

Alderman COOK said it would be a bad precedent to establish to let the advance in Mr. Hack's salary date as far back as July last, and he hoped the resolution would be altered so that the advance should commence in January of the present year.

Alderman POLLACK agreed to accept the alteration; and the resolution, as amended, was put and carried by 25 votes to 17 votes.

SALFORD CORPORATION GAS SUPPLY.

THE FINANCES OF THE DEPARTMENT—REDUCTION IN THE PRICE OF GAS.

At the First Monthly Meeting of the Council of the County Borough of Salford last Wednesday—the MAYOR (Mr. Alderman A. L. Dickins) presiding—a long discussion took place on a resolution of the General Gas Committee in favour of the transfer of a sum not exceeding £60,000 from the depreciation fund to the profit and loss account.

The MAYOR stated that this matter was very freely discussed at a meeting of the General Purposes Committee on the previous Monday. They, however, arrived at no conclusion whatever, although they had a great many proposals before them; and it was now for the Council to decide the matter.

Alderman HUSBAND moved a resolution confirming the one adopted by the Gas Committee. He stated that there was at the present moment lying useless and cumbersome in the treasury of the Corporation, a large sum, including £77,898 which stood to the credit of the gas-works depreciation account, and £11,705 for meter depreciation—in all £89,603. His contention was that, according to the Act of Parliament, the sum they had been setting aside annually for depreciation was in excess of the requirements, and that the amount of the excess ought to be given back to the ratepayers of the three districts of Salford, Pendleton, and Broughton, who were the owners of the gas-works. On reference to the accounts, he found that during the past ten years they had spent, out of revenue and depreciation, the sum of £199,504 in maintaining gas-works, the original cost of which was only £548,000. This being so, he thought that if the gas-works had not been kept in an efficient condition, the money had been used in a manner calculated to reflect little credit on those who had spent it. In addition to this £199,504, they had placed in depreciation funds the £89,603 of which he had spoken. In this way they had set aside far more than they should have done; and not only so, but of the original cost of the gas-works they had paid off £126,000. There was a strong and highly commendable feeling in favour of keeping the gas-works in an efficient and even in a very strong and commanding position. He was quite able to sympathize with that; but at the same time, he objected to a continuance of the present extravagance. He would probably meet with opposition from the Gas Committee, and was not surprised that some of the members should wish to remain in possession of a large reserve fund. If the Gas Committee required more money for capital purposes, they could get it in the ordinary way. They had accumulated in their depreciation fund more than they had any right to do; and as an act of justice, they should now give it back to the ratepayers. He only asked that £60,000 should be divided, which was not the whole sum; and this would leave them with an ample balance of £30,000.

Mr. COOK seconded the motion.

Mr. LORD, Chairman of the Gas Committee, said he thought Alderman Husband had assumed several things which he was not justified in assuming. He had stated that the Gas Committee had done all that the Act contemplated in the way of replacements, renewals, and repairs; and that the depreciation fund had increased to an extent that was not required. Now they had not kept up the works in an efficient state of repair. The old Gas Committee had in contemplation years ago the rebuilding of the Liverpool Street works. To put these works into good condition, the old Gas Committee contemplated an expenditure of £50,000 or £60,000; but the new Committee hoped to have the extensions carried out for £40,000. In view of the whole position of matters, and particularly of this prospective expenditure, he thought the proposal to divide the sum of £60,000 amongst the three districts of the borough was unreasonable and unjust. It was unreasonable because they had been told over and over again that the capital of the gas-works was excessively large, as compared with the capital invested in other gas undertakings in the kingdom. Many thousands of pounds had been spent on the works which had been entirely unproductive; and would it not be better, he asked, seeing they had this large sum of money

accumulated, to take a liberal interpretation of the Act, and improve the works to the utmost extent out of this large depreciation fund? By the judicious expenditure of £40,000, they could increase the manufacturing capacity of the gas-works 28 per cent.; and no doubt other improvements would be necessary. Then, while using the fund in this way, it would be a very easy thing to say that in future they should add only a trifling amount per year to the fund, so that it might gradually be reduced. He thought the proposal of Alerman Husband was an unwise one, because it left the gas consumers out of account. In the years during which the money had been accumulating, the ratepayers had received out of the profits the amounts to which it was thought they were entitled; and these amounts the gas consumers had had to pay. He had always been against any division such as was proposed. If there was any division, the amount ought not to exceed £18,000.

Alderman KEEVNEY moved that the sum to be transferred should be £41,354. Every member of the Council, he said, appeared to be of opinion that there should be some division of money; and he thought the sum he proposed would be a happy medium between the £60,000 and the £18,000.

Mr. RYCROFT seconded the amendment.

After further discussion, the vote was taken, and Mr. Keevney's amendment was declared carried.

Mr. LORD then moved a further amendment, to the effect that the amount transferred be £18,700, and the amount of interest thereon which had been allowed by the bank.

Mr. PHILLIPS seconded this amendment, which on a division was lost.

On Alderman Keevney's amendment being put as the substantive motion, it was adopted by a majority of 30 to 16.

On the motion of Mr. LORD, seconded by Mr. HOLLAND, it was resolved to make a general reduction of 4d. per 1000 cubic feet in the price of gas.

LEEDS CORPORATION GAS SUPPLY.

ALDERMAN SPARK AND THE GAS COMMITTEE.

At the Meeting of the County Council of the borough of Leeds last Wednesday, the above-named matters were introduced. The Mayor (Mr. Alderman Ward) said he wished to make a suggestion in regard to the little difference which had arisen out of certain statements made by Alderman Spark in reference to the Gas Committee. It was hardly desirable that a discussion of the character of that at the last meeting of the Council should take place, because the Council then arrived at no result. If Alderman Spark was willing to meet the Gas Committee in a friendly spirit, and the Gas Committee were prepared to meet Alderman Spark to go into the alleged irregularities in connection with the management of the Gas Department, they might arrive at a result more satisfactory than bitter and acrimonious discussions in the Council. He appealed to Alderman Spark and to Mr. Gilston whether such an arrangement was possible. Mr. Gilston (Chairman of the Gas Committee) said the Committee would never stand in the way, and never had stood in the way, of any one giving them information. They had a resolution on their books asking Alderman Spark to meet the Committee. The Mayor observed that there seemed to be some slight objection to the wording of the resolution, inasmuch as Alderman Spark was asked to "justify" his position. That seemed to him an unfortunate word to use. Alderman Spark assented to the suggestion of the Mayor that he should go before the Committee in a friendly spirit. He had never intended anything else. If he had ever been a little warm in stating things, it had been perhaps because he felt that for some time past every statement he had made had been attacked and rejected without proper deliberation. But he did not make statements without good grounds for them. He would not go into the matter now; but after the statement of Mr. Gilston, he would certainly go before the Committee; and he hoped they would receive him in the same friendly spirit in which he would meet them. The subject then dropped.

NEW JOINT-STOCK COMPANIES.—The Milford Water-Works Company has been registered with a capital of £2000, in £1 shares, for the purpose of supplying the parish of Milford, in Wiltshire, with water, and to carry on the general business of a water company. The Halifax Mutual Electric Light and Power Company, Limited, has been registered with a capital of £20,000, in £5 shares.

UNLAWFUL CONSUMPTION OF WATER.—At the Lambeth Police Court recently, James Munday, the owner and occupier of premises in Auckland Street, Vauxhall, was summoned, at the instance of the Southwark and Vauxhall Water Company, for taking in an unlawful manner water belonging to the Company. There was also a second summons charging him with having tampered with the Company's pipes for the purpose of stealing water. It appeared from the evidence that the water supply at No. 51, Auckland Street, was cut off in 1884, in consequence of the non-payment of rates. The premises were subsequently visited by one of the Company's inspectors, who found that there was a door between the house in question and the next one, and that a branch-pipe had been introduced, by means of which water was carried to No. 51. The pipe had been put in without the knowledge or sanction of the Company. After a long discussion, the Magistrate (Mr. Biron) suggested that the defendant should calculate the amount of water he had obtained by means of the pipe, and pay the Company for it in full. The defendant ultimately agreed to adopt the course suggested, and paid £4 12s. 6d., together with £1 3s. costs.

THE OTLEY LOCAL BOARD AND LIABILITY FOR DAMAGE TO GAS-MAINS.—At the meeting of the Otley Local Board on Monday last week, the Chairman (Mr. T. A. Duncan) referred to the action which a Sub-Committee had taken in regard to the application to Parliament for extended powers on the part of the Gas Company. The Sub-Committee he said had had a great deal of correspondence through the Board of Trade with the Company, with the object of protecting the Board's rights; but the Board of Trade could not compel the Company to insert any new clauses which the Sub-Committee deemed necessary in the Board's interest. It was therefore necessary to decide whether or not the Company's application for a Provisional Order should be opposed before a Committee of the House of Commons. By a decision in the Law Courts, a local authority had been made liable for damage to gas-pipes caused by the use of a steam-roller in the repair of the highways. The Committee thought the Local Board should be protected against liability of this sort; and they therefore proposed that a clause to the following effect be inserted in the Order:—"The Otley Local Board, as a road authority, entrusted with the maintenance or repair of roads within the district of the said Board, shall not be liable to make good any loss or damage by reason of any injury to the pipes or mains of the Company arising in the exercise of its duty as a road authority." The Gas Company objected to the clause, and argued that the present state of the law was the most equitable—that each party should be liable for its own negligence, and that special provision should not be inserted for the purpose of establishing a precedent for the whole of the kingdom. After discussing the matter, it was decided to oppose the application of the Company.

ELECTRIC LIGHTING IN THE METROPOLIS.

BOARD OF TRADE INQUIRY.

FIRST DAY—WEDNESDAY, APRIL 2.

To-day Major F. A. MARINDIN, R.E., opened at the Westminster Town Hall an inquiry on behalf of the Board of Trade respecting the thirteen applications which they have received for Provisional Orders, under the Electric Lighting Acts, 1882 and 1888, from promoters of schemes of electric lighting for various parts of the Metropolis. In view of the importance of the inquiry, and of the number of interests affected, there was a full attendance of Counsel and representatives of the parties.

Mr. PEMBER, Q.C., Mr. A. K. LLOYD, and Mr. GRAHAM appeared for the London Electric Supply Corporation, Limited; Mr. MOULTON, Q.C., and Mr. R. S. WRIGHT, for the Chelsea Electric Supply Company; Professor HUNTER, M.P., for the Electric Power Storeage Company; Mr. GOLDNEY (the City Remembrancer), for the London Commissioners of Sewers; Mr. J. SPENCER, for the Greenwich District Board of Works; Mr. J. H. HORTON, for the Paddington Vestry; Mr. E. BAILEY, for the St. Olave's District Board of Works; Mr. E. MOORE, for the Great Eastern Railway Company; Mr. HITCHENS, for the St. George's, Hanover Square, Vestry; Mr. WALLACE, for the National Electric Lighting Company; Mr. T. P. GUNTON, for the London County Council; Mr. H. WILKINS, for the St. James's (Westminster) Vestry; Mr. G. HOPWOOD, for the Holborn District Board of Works; Mr. T. ECCLESTON GIBB, for the St. Pancras Vestry; Mr. PAYNE, for the North London Railway Company; Mr. HARRISON, for the Bermondsey Vestry; a number of other local bodies being also represented.

Major MARINDIN, in opening the inquiry, stated that to the applications for Provisional Orders which were at present before the Board of Trade, a large number of objections had been raised. It was impossible to go into the details of the objections to the whole of the thirteen applications at once; and therefore he had decided to take first the case of the London Electric Supply Corporation, whose proposed area covered a larger number of parishes in the Metropolis than did that of any other of the applicants. In reporting for the Board of Trade, he should be rather inclined to deal specially with the subject as affecting the Metropolis. He then explained the order of procedure which would have to be followed in the inquiry.

Mr. PEMBER said he appeared on behalf of the London Electric Supply Corporation, Limited. Their authorized capital was £1,250,000, of which the subscribed capital was about £800,000, and the paid-up capital £585,000. They had already expended in the prosecution of their works £430,000; and therefore they had on hand a balance of capital actually paid up of £150,000. This showed that they had to deal with a Company which was very powerful and thoroughly substantial. Not only had they the money; but they were expending it in a thoroughly wise and far-seeing way. They had commenced operations by buying from Sir Coutts Lindsay's Company the Grosvenor Gallery station; from which they supplied upwards of 33,000 lights. The business they had already conducted had given them a very considerable insight into the method of supplying electricity both for private and public purposes; and this experience had led them to decide against establishing generating stations in populous neighbourhoods. The system of the Company he represented was the very opposite of that of their opponents; for, instead of having a generating system in each district of London for the supply of this particular locality, they proposed to have one large station at Deptford, from which they would have trunk mains for supplying the different parts of the Metropolis with electricity at high pressure, while in London itself they would have distributing stations, street mains, and wires for supplying the different private consumers. There was consequently a line of demarcation between their system and that of every one of their competitors. The area specified in the Provisional Order for which they had applied, was undoubtedly a large one. They did not, however, ask for any exclusive grant of the district over which the powers of the Order extended. Neither did they oppose competitors; for they were quite ready, if it was thought fit, to see the Board of Trade grant powers to anyone else within the limits of the area over which they sought jurisdiction. There were two main questions of principle which were applicable to the case of his clients. The first was whether it was advisable to grant powers over a large area to one company; and the second was whether it was advisable to give more than one company authority over that area. To both of those questions he answered "Yes."

Major MARINDIN: Do you limit yourself to two companies?

Mr. PEMBER said he did not—to two or more companies. Counsel proceeded to urge that Parliament had obviously intended competition, and it had not fixed any maximum price to be charged for electric lighting. Therefore the Board of Trade should be open to consider the question of unlimited competition in each area. It was obvious that the first question should be answered in the affirmative, because if it were held to be advisable to grant to more than one company powers over the same area, there was no harm in assigning to one company as large an area as they thought fit to cover. By having an extensive area they could employ their capital profitably; and the chance, in fact, of a large and remunerative business resulting was a very great encouragement for the application and investment of capital. Further, this would, provided it was well applied and judiciously invested, induce cheapness in the article supplied and economy in the working of the undertaking. It would encourage the seeking of the best appliances, and generally would lead to enterprise and make the concern prosperous and profitable to the public as well as to the projectors. There was nothing in the two Acts of 1882 and 1888 to prevent the Board of Trade from giving effect to the view he thus expressed. The Board had a free hand, and he hoped they would use it. He trusted that Major Marindin would visit the Deptford works of the Company, who looked forward to being one of the largest purveyors of electric light, and to do something for the London public analagous to that which The Gaslight and Coke Company had done when they moved out of London to their large works at Beckton. The Company's plant consisted of engines and dynamos of 10,000-horse power each, and smaller ones of 1500-horse power each. This plant would be amply sufficient to give a constant supply of electricity for 230,000 lights. It could be speedily duplicated, or even quadrupled if necessary, on the present premises, and could readily supply daily 1,000,000 lights. For bringing the trunk mains into London, the Company had a very simple and wisely designed expedient; for, instead of breaking up the streets as they went along, they had made agreements with the South-Eastern, the Brighton, the Chatham and Dover, and the Metropolitan Railway Companies, for carrying their mains along the outside parapets of their bridges. They would then be taken to various distributing stations, where the high pressure at which the current of electricity had been brought to London would be reduced so as to make it suitable for private use. The current would be carried along distributing mains, which would be laid in the ground under the streets. With respect to the character and size of their mains, he exhibited a model, and said that as the Company proposed laying them, it would reduce the breaking up of the streets to a minimum. In this work they were prepared to co-operate with any other companies who might be supplying the same district, so as to avoid

interfering with the streets more than was absolutely necessary. Counsel next referred to the applications of other parties, and said he should not oppose them unless there was to be only one company for each district. Then he should oppose them all, as he should contend that the system of his clients would be the best for the supply of London, and should be the only one allowed. If there were to be competing systems, they did not fear any of them. He then went at length into the objections to the application of the Company he represented, in the course of which he urged that many of them were as to requirements which the Board of Trade would, as a matter of course, see were carried out before granting the Order asked for. As to the question of overhead wires, he said that the proposal of some of the objectors was that words should be inserted to the effect that the Order was not to confer any powers to place overhead wires. He believed they had a common law right, if they obtained the consent of owners and occupiers, to carry wires, if sufficiently high, from house to house; and he should strenuously object to any words being inserted which would have the effect of controlling or reducing that right. He was quite ready to admit into the Order words to the effect that the Order itself should not confer any such power. His clients had agreed to consent to these words, which had been put into several Orders: "That nothing in this Order shall authorize the undertakers to place any electric lighting wires above the ground across the streets without the consent of the local authority." Among other questions upon which there was some opposition were those relating to the time for laying down mains, the power of the local authorities to compel the lighting of streets, the exemption from the rules of the Metropolitan Building Act of 1855, the means of recovering sums due from the Company to the local authorities in regard to reinstating the streets, the powers of the Board of Trade to vary Orders previously made, and the protection of the rights of local authorities. As to the opposition of the City of London to his clients' application, he should like to say that the City had taken up a most exceptional position. They said, in effect, that they had powers under their own Act of Parliament, which authorized them to grant the requisite facilities to electric lighting undertakers without the intervention of any Provisional Order or Licence. They claimed that they were not subject to the provisions of the Electric Lighting Act, and declined to assent to any powers being granted by way of Provisional Order under the Electric Lighting Act which would affect the area of the City. They stated further that they had elaborated plans under which they sought to have the City lighted by public tender. These plans were open to grave objection, and he did not think that any electric lighting company which valued its position would accept the terms in the form of tender proposed by the City authorities. Besides this, he took exception to the line taken by the City—that they were outside the meaning of the Electric Lighting Act; for the schedule of the Act defined "the City of London and its Liberties" in its schedule which referred to local authorities. The City was certainly under the jurisdiction of the Board of Trade with regard to the supply of electric lighting.

Lord *Crawford* was then called and examined by Mr. LLOYD. He stated that he was Chairman of the London Electric Supply Corporation, Limited. There were many inseparable objections—such as smoke, vibration, noise, and general discomfort—to working electric machinery in populous neighbourhoods; and it was very desirable to have such premises as his Company had erected at Deptford. This was also the experience of other companies in crowded districts. He then gave evidence corroborative of Mr. Pember's opening statement as to the capital and resources of the Company, and stated that the development of electricity as a motive power would throw into the shade its use for lighting purposes. In regard to the question of disturbance in laying the distributing mains, there was no reason why two or more electric mains should not be laid down in close proximity to one another without inconvenience.

Mr. LLOYD: Does your Company seek any monopoly?

Witness: We are entirely opposed to monopoly. We think it contrary to the desire of Parliament; and we do not ask for any exclusive power.

In the event of its being held that in the first instance only one company should be admitted to one area, you claim to be that company?—We claim to be the best.

Examination continued: With regard to all the sections of the Provisional Order having reference to testing and meters, we propose to leave ourselves in the hands of the Board of Trade.

Cross-examined by Mr. MOULTON, witness admitted that there was no system mentioned in his Order which he suggested other undertakers could not adopt. His Company approved of fair competition—friendly competition. There was no penalty for not attending to a requisition for laying down mains.

Mr. MOULTON: Are there any words in the Order to prevent your Company from picking what part of the area you chose in which to lay down mains, and neglecting the rest?

Witness: Every business man would start with the best part of the area first, and deal with the other afterwards.

But is there a part of the Order which would prevent you declining to attend to any but the best part of a district?—There is nothing but the requisition. There would be no possible reason for us to decline, I can assure you.

Witness was further cross-examined with the object of showing that the Order of the London Electric Supply Corporation was more advantageous than that of the Chelsea Company which the learned Counsel represented, and was also asked questions as to whether his Company had provided for thoroughly lighting the area they sought to supply. In reply, witness stated that he had not thoroughly gone into this matter, but that the Company's Engineer would doubtless be able to give the information. Nor could he tell approximately the amount of capital which would be required, as it was not possible to state the number of lights that would have to be furnished. Although it was not intended to have duplicate mains, the single mains would be so interlaced, by means of crossings from one side of the street to the other, that they would practically duplicate, and there would be no stoppage if the supply of one side failed.

Mr. GOLDNEY then proceeded to cross-examine the witness on behalf of the Corporation of London, and asked why the City had been included in the scheme when the Company of which witness was Chairman had excluded other parts.

Witness: We think we can do good business in the City. We have applications for, I should think, 70,000 to 100,000 private lights to begin with.

Asked as to the financial position of his Company, and to give some figures as to his calculations, if he had made any, upon which he based his opinion that there was to be a good business done in the City, witness stated that he could not answer the questions straight off. Asked why the Company declined to go to certain areas—especially St. Mary Abbotts, Kensington—witness replied that this district had been abandoned because the Company had been asked by the local authorities to light a few turnip fields and Kensal Green Cemetery.

Major MARINDIN: As a matter of fact, the Kensington Vestry have split up their parish into five or six separate areas, and given them to different companies. The part assigned to the Company was not likely to be very remunerative.

In further reply to Mr. GOLDNEY, witness stated that they had temporarily abandoned Paddington as not being so favourable as other parts; St. John's, Hampstead, as being rather far off; and, with the view of reducing the area, also St. Mary, Islington, St. Leonard's, Shoreditch, St. George's-in-the-East, the Whitechapel district, part of St. Mary, Lambeth, and St. George the Martyr, Southwark. At present they contemplated lighting only the remaining area in the Order; but at some other time they hoped to include the whole area as it originally stood.

SECOND DAY—THURSDAY, APRIL 4.

This morning the cross-examination of Lord Crawford was resumed.

Mr. GOLDNEY: What is your objection to not eliminating the City from your Order?

Witness: One important reason is that it practically forms part of our system on the way from Deptford. Secondly, the City is important to our scheme, inasmuch as the greater part of the lighting work of the City will be done in the daytime.

The question of the area of the City is, to put it no higher, of considerable convenience to you?—It would be of great convenience and also of money value.

Whereabouts do you propose to enter the City?—At Cannon Street Station and Ludgate Hill Station, and I hope eventually there will be another point of entry.

If you have a way-leave for a thoroughfare in the City for your mains, do you not think you ought to pay?—That opens the question of capital. I can give you an estimate, although I cannot exactly allocate the capital. If I can be informed how many lights are required, I can give an indication of the capital required. We do not ask for a way-leave for nothing. We take the responsibility in connection with it.

What do you consider the responsibility?—The responsibility thrown upon all undertakers by the Provisional Orders.

That is your own Provisional Order?—I hold that we are obliged to light any place within our area, when requested; the penalty for not doing so being the risk of failure altogether, and of being turned out of the area.

What system of lighting do you propose for the City?—We are prepared to adopt any system that may be required.

Mr. PEMBER: We do not take any powers to light streets in any particular method; but it is distinctly stated in the Order that we do not interfere with the method which those who take our supply chose to introduce. It is for them to introduce the method they choose, and for us to provide the supply and to charge.

Mr. GOLDNEY: We are prepared to do the thing ourselves. We do not want a Provisional Order.

Witness: With regard to the specification sent out for the City a few days ago, I see that they require a total of 1547 burners for their three districts—for the first district 388 burners; for the second, 526 burners; and for the third, 633 burners. Those are gas-burners. For each district there would be an average of about 500 electric arcs to supplant the 1500 gas-burners.

What number do you contemplate by this Order?—I contemplate eventually the lighting of the City, according to the number of miles furnished by your office, as being 50 miles; and I thought we should eventually have to light 50 miles of streets if you were satisfied.

You never realized to yourself any definite concrete scheme for lighting the City?—I do not think I should be called upon to waste time over a hypothetical scheme which is likely to be upset by the local authority.

Are you prepared to light the City upon as favourable terms as you offer to anyone else?—I am prepared to light the City upon as good terms as anyone else.

But on as good terms for the consumers?—You cannot expect me to answer that, because I do not know what offers have been made to you. We are prepared to treat the City as liberally as any other area.

Why did you deal tenderly with the Chelsea Company?—Because I did not think it fair that a Company which had obtained statutory powers should have powers less than those who came in afterwards; and consequently we consented to put ourselves in more unfavourable circumstances in regard to that special parish than in other cases.

Seeing that the Commissioners of Sewers have statutory powers for lighting the City, and have lighted parts of it, can you tell me why the City should not be treated as fairly as Chelsea?—The City is under the Act of 1882.

You are not aware, perhaps, that the Commissioners have powers to light, and have lighted the City?—I am aware that they have an Act, but not that they have lighted. I know there has been electric lighting in the City; but I am not aware that it was done by the Commissioners of Sewers. My impression was that it was done by a contract with a company. I would not tender under the specifications issued by the Commissioners of Sewers; they are too onerous. It is not for the Commissioners to say that companies are not to supply electricity when there is power under the Act for them to do it. It is for the Board of Trade to say whether there should be a Provisional Order or not.

Why should not the Commissioners of Sewers be in the position to judge for themselves without going to the Board of Trade?—I do not know that I can add anything further. They are under the Electric Lighting Act of 1882.

Are you not aware they are also under the Act of 1888?—Of course.

Then I will draw your attention to this point in the Act: "In any case in which consent of such local authority is refused, and the Board of Trade are of opinion, having regard to all the circumstances of the case, that such consent ought to be dispensed with, and that a special report should be made stating the ground of the dispensing with such consent."

By Mr. C. A. CRIPPS (for the Metropolitan Electric Supply Company, Limited): He had considered the question of whether it is more economical to supply electricity from one large station than from a certain number of small stations as proposed by the London Electric Supply Corporation, and it was his conviction that it was. One reason why it was more economical was the saving in the cost of conveyance of coal. He did not know that the Metropolitan Company proposed to have two river-side stations. He understood that there was one above-bridge. But putting aside the cost of coal, the question was whether they could work without causing a nuisance; and this depended to a great extent upon the special surroundings of the stations. Another point would be whether the machinery itself could be worked so as to be noiseless and cause no vibration. It would be easier of supervision to have all the works under one roof, and it would reduce the expenses, and so indirectly benefit the consumer.

Mr. SHIRESS WILL (for the House-to-House Electric Supply Company) stated that they had applied for a License for St. Martin's-in-the-Fields, and had obtained the consent of the local authority. He proposed to put a few questions to witness as to the policy of one large company as against several small companies.

Major MARINDIN said that if such questions were to be raised, it would be a great convenience if it was done by one Counsel only.

Mr. WILL (to witness): What portion of the large sum of money you have taken credit for spending has been laid out upon the works at Deptford?

Witness: That is shown in our balance-sheet.

You are asking power for a company with a capital of £1,250,000, and you take credit for spending nearly £500,000, and you are not prepared to say what portion has been expended upon the works. Do you intend to carry out the Provisional Order?—Yes.

Do I understand that you intend to have duplicate machinery, and that each machine will be capable of producing the whole amount of electricity required?—We have unit machines in the same way as the House-to-House Company; but our units will be rather larger than theirs, and we always keep one spare unit in case of a break-down. If that broke down we should be in the same position as anyone else under the same circumstances.

You propose to take power over a very large area. Have you made up your mind in what districts you will commence, or whether you will begin over the whole area at once if you obtain the powers you seek?—I should say the proper thing would be to commence over the whole ground at once with as many gangs of men as there are points to start at.

Have you made any calculations as to what the cost will be, assuming you begin over the whole ground at once?—I can give you an estimate of the entire cost; but until I know the number of miles required to be lighted I cannot tell. When we have done one mile, we can supply, and then go on with the second; as the demand arises, so can we extend our system.

That is not going over the whole ground at once. You are, as I expected, desirous of creeping along?—But it is creeping from many centres.

However, how many centres do you propose to "creep" from?—From as many centres as we have local authorities in our areas—that is 18.

What will it cost you, supposing you creep over 18 centres, and do the work for which you seek power under the Provisional Order?—A mile of mains from 18 centres we can do for from £25,000 to £30,000. We can make a main at about £100,000 per mile; and it will take 12s. 6d. per yard for excavations.

Will there not be a considerable loss in distributing from the one station at Deptford to those 18 sub-centres in the Metropolis?—Your clients will know perfectly well what that loss will be.

Mr. R. W. WALLIS (for the Westminster Electric Supply Corporation) also put some questions with regard to the expense of making the mains per mile, and also the cost of excavations, and asked whether the 12s. 6d. per yard for breaking up the streets was the average.

Witness, in reply, stated that this was the average; but going through some points it would probably be more.

Mr. H. WILKINS (for the St. James's Vestry): You say that by your method as conducted at the Deptford premises, it would tend to reduce the price of electricity?

Witness: Yes, in course of time.

Supposing there were five electric light companies competing in Piccadilly or Regent Street, there would be five sets of mains. Who then would bear the cost?—Those who put them in.

But would it not ultimately be the consumer?—Of course you could not reduce the price of electricity if you were not making a profit—that is unless you were doing it for an advertisement.

If there were free trade in electric light, do you not think that an unlimited number of companies would cause an unnecessary repetition of mains, and unduly increase the capital required?—I never contemplated an unlimited number, and the Board of Trade have power to say how many there shall be. I am in favour of proper competition.

With regard to the wires across the streets, what is your objection to the request of the Vestry that the local authority should prevent this?—I do not see why the Vestry should override common law.

Would it not be better for the local authorities to be able to have such powers, so as to be able to protect the general body of consumers—that the local authority should embody the proceedings in one process, as is the case with the gas companies?—I object to the local authority compounding for the private consumer.

Mr. CRIPPS (for the Strand District Board of Works and the parish of St. James's, Marylebone) then handed in several letters forming the correspondence between that body and the London Electric Supply Corporation with regard to negotiations between them as to supplying that district with the electric light, and then asked witness if he still pressed for the inclusion of the Strand district in his area?

Witness said he did.

Although you were aware that the District Board object to your having powers?—I am not aware of that; we have no complaint.

With regard to the crowded state of the thoroughfare, have you considered within what space in the Strand distributing mains could be laid?—I do not see any grave difficulty in laying mains in the Strand.

As to Marylebone, you have already modified your proposals?—Yes, so far as the area is concerned.

You take no part of the parish north of the Metropolitan Railway?—That is so. North of Marylebone would be the boundary on the north, running down by way of the road between Paddington and Marylebone would be the boundary on the west, down St. George's, Hanover Square, Old Brompton Road, to Chelsea.

Professor H. ROBINSON (on behalf of the St. Pancras Vestry) asked that the area which the Company proposed to include should be defined.

Witness stated that it was bounded on the north by the Euston Road as far as the boundary of the parish.

In re-examination by Mr. LLOYD, witness stated that the clause in their Order as to there being any area in which they would be compelled to set to work at once was similar to that sanctioned by the Board of Trade last year with the Metropolitan Electric Company, and the clause was in the same form in the Bill that Company are promoting this year.

Mr. LLOYD: As to your not having allocated any capital to a particular area, are you prepared to give an equivalent provision in lieu of it if required to do so?

Witness: I was pressed very much yesterday whether we had allocated any capital to the districts, and I now hand in a table which shows how we have thought we might best use the current at our disposal. We have in our area 18 local authorities to deal with; and for the moment I assume that we have 350,000 lights, as we have sufficient capital for this number. And this is how I propose that the lights should be allocated to the different local authorities: Deptford and Greenwich, 10,000; Rotherhithe, 10,000; Bermondsey, 10,000; St. Olave's, 10,000; St. Saviour's, 10,000; Lambeth (part of), 10,000; St. Martin's-in-the-Fields, 20,000; St. Margaret's, Westminster (part of), 15,000; St. George's, Hanover Square, 30,000; Chelsea, 15,000; St. James's, 15,000; Strand, 15,000; St. Giles's, 10,000; Holborn, 15,000; Clerkenwell, 10,000; City of London, 30,000; Marylebone (part of), 15,000; St. Pancras (part of), 15,000. Our present capital will enable us to complete our station to the extent of supplying 450,000 lights. Keeping 100,000 in reserve, leaves 350,000 available to be used as above, with a surplus of 85,000 lights. The City lighting is mostly daylight work, and during the day we are prepared to supply current for 100,000 lights. The number of lights allocated to the local authorities comes to 265,000. That will absolutely leave us a machine standing still capable of giving 100,000 lights, and have in hand 85,000 more.

Is that well within your powers to fulfil?—Yes; but I doubt whether it will be possible to secure customers sufficient to utilize this amount within twelve months after the sanction of the Order.

What are the boundaries of your area?—Dorset Square and Regent's Park to the North; Lincoln's Inn and the Law Courts to the East; Soho Square to the South; and Albert Gate to the West. We have one main as far as Sloane Square; but there is no difficulty in supplying the district as far as distance from Deptford is concerned.

Mr. *S. Z. de Ferranti*, the Engineer of the London Electric Supply Corporation, was then examined by Mr. J. C. GRAHAM. He said that as to the disposition of the lights among the different districts of London, he had about 18 months ago worked out the subject, and apportioned a certain number of lights to each district. Circumstances since then had but very slightly changed; and the apportionment he made was almost exactly that submitted in the table handed in by Lord Crawford. The witness gave statistics as to the plant, machinery, and engine power at Deptford and the capability of producing lights, which also was in effect the same as that deposed to by the previous witness. There were to be laid down six mains with conductors—one from Deptford to London Bridge; one from London Bridge to Cannon Street; two to Blackfriars; and two to Charing Cross. The carrying capacity of each main would be 100,000 10-candle lamps. They were going to have a capacity of 600,000 lights; but they would always have a considerable margin. At present they had a margin of 300 per cent. The mains were so arranged that anyone could be thrown into connection with any of the engines at Deptford; so that if any one of the four at Deptford broke down, they could immediately put the mains working from it on to the other dynamos. In fact, to have a total failure of light in London, there must be a break up of both the engines and the mains—a complete collapse of the whole thing. The tension of the mains was 10,000 volts. He explained the action of the transformers, and how they were placed on the mains. The insulating capacity of the mains had been completely tested; and the system they intended to adopt was absolutely safe as regarded life. He then spoke of the economy of doing a large business under one roof, and said that the advantages of having a generating station at Deptford were the avoiding of nuisance caused by machinery in motion; dispensing with carting of coal or ashes; no smoke or steam escaping and causing annoyance; and no danger of delay or stoppage of the coal supply by the roads being impassable during snowstorms, from which they had suffered at the Grosvenor station. Then there was the cheapness of the coal, and of the land at Deptford, and the advantage of a large storeage capacity for coal; and being on the banks of the Thames, they could easily get their water—a large quantity being required for condensing purposes.

Cross-examined by Mr. MOULTON, witness said that other companies could have the advantages of a river-side site. The success of the system of the Corporation lay in its details, every one of which was special. And it was upon the success of those details that they based their hopes of the successful carrying out of the system.

Witness was questioned at some length as to his knowledge of the use and working of the transformer system elsewhere than by the Corporation he represented, with the view of showing that it was to some extent an experiment in electric lighting machinery. He said there had been a number of difficulties and breakdowns, but they were none of them due to electrical troubles.

The inquiry was then adjourned.

ASSESSMENT OF GAS-WORKS FOR INCOME-TAX.—The Bolton Town Council have decided to appeal against the assessment for income-tax in respect of their gas undertaking.

ADOPTION OF THE CLAUS PROCESS AT BURY.—At the meeting of the Bury Town Council last Thursday, the Gas Committee reported that they had accepted a tender of Messrs. C. and W. Walker for Claus apparatus; and their action was confirmed.

THE DARWEN CORPORATION AND THE DINSMORE PROCESS.—The Dinsmore process is to be tried at Darwen. A deputation appointed by the Gas and Water Committee recently visited Widnes, witnessed the process, and ascertained the terms on which the Dinsmore Company would allow a trial to be made. The result was a resolution to try the process, subject to the arrangement of satisfactory terms; and this was confirmed by the Town Council yesterday week.

REDUCTIONS IN PRICE.—On Monday last week the *Barrow-in-Furness Corporation* adopted a recommendation of the Gas and Water Committee that the price of gas should be reduced from 3s. 6d. to 3s. per 1000 cubic feet.——The *Rochdale Town Council*, at their meeting last Wednesday, adopted a recommendation of the Gas Committee to reduce the price of gas to outside consumers by 3d. per 1000 cubic feet, as from the next quarterly inspection of meters, with discounts as heretofore.

SALES OF SHARES.—On the 28th ult., Mr. J. C. Towner sold by auction, at Eastbourne, 17 original, 25 "B," and 22 "C" shares (all £10) in the *Eastbourne Gas Company*. The dividend on the original and "C" shares for the half year ending Dec. 31 last was at the rate of 12½ per cent. per annum; on the "B" shares, at 9½ per cent. per annum. The original shares realized prices ranging from £26 7s. 6d. to £26 12s. 6d.; the "B" shares fetched £19 apiece; and of the "C" shares, 17 sold for £26 7s. 6d. each, and 5 for £26 10s. each.——At a recent sale at Bridlington, 43 fully paid £10 shares in the *Bridlington Gas Company* realized £23 10s. each; and 46 fully paid £5 shares in the *Bridlington Water Company* sold at prices ranging from £9 1s. to £9 9s. per share.——Yesterday week, some "A" stock of the *Preston Gas Company* realized at a sale by auction an average of £221 15s. per cent., and some "B" stock about £159 per cent.

DARLINGTON CORPORATION GAS SUPPLY.—At the meeting of the Darlington Town Council last Thursday, the Gas Committee submitted their report and half-yearly statement of accounts, which showed a profit of £3072 13s. In moving the adoption of the report, in the absence of Alderman Walker, Chairman of the Committee, Mr. Manson said although the amount received for gas had been £348 less than in the corresponding period last year, there had been a reduction in expenditure of £663, and an increase in consumption of 1,833,000 cubic feet, despite the fact that the Darlington Iron Company had adopted the electric light at their works during the past half year. The Council might fairly look upon this significant fact as evidence that the reduction in price had been followed by additional consumption. The townspeople appreciated the opportunity of obtaining a cheaper light. There had been an increase of £345 in the receipts from coke, tar, and ammoniacal liquor, and of £14 in sundries; and if the reduction in the price of gas had not taken place, there would have been an increase on that head of £323, so that consumers had the advantage of upwards of £670. Having given up this £670 to the consumers, the Committee were able to declare a profit, after paying interest and setting aside the necessary amount for liquidation, of £1488 for the half year. The report was adopted.

THE LONDON COUNTY COUNCIL AND THE WATER SUPPLY.

At the Meeting of the London County Council last Tuesday—Lord Rosebery in the chair—the Standing Committee reported that, in accordance with a reference made to them on the 19th of March (*ante*, p. 584) they had selected fifteen members to serve on the Special Committee on the London Water Supply, and they recommended—"That the Special Committee on Water Supply do consist of the following members:—Mr. Beal, Mr. Brereton, Mr. Collard, Mr. Cohen, Mr. Doubleday, Sir T. Farrer, Mr. Gibb, Mr. F. Harrison, Mr. A. Hoare, Mr. Hunter, Captain James, Mr. Leon, Lord Lingen, Mr. Smith, and Mr. Watney."

Mr. E. Austin, referring to the constitution of this and the Bridges Committee, said he objected to the way in which the Committees were appointed. It was, it seemed to him, necessary to be either a lord or to be constantly in evidence before the Council to qualify oneself for appointment on Committees. He therefore moved, as an amendment—"That the members of the Committee be balloted for."

Mr. W. Johnson stated that he had made application to be appointed on the Special Committee on Water Supply; and he complained that no notice whatever had been taken of his request.

Lord Lingen said he had no desire whatever to be on the Committee. In fact, he had been nominated without his knowledge, notwithstanding that he had written expressly to state that he could not serve.

Mr. T. B. Westacott remarked that the appointment of the Committee had been referred to the Standing Committee; and the Council therefore had no power to select the Committee by ballot, as suggested in the amendment.

Sir J. Lubbock stated that Mr. Beal, who had moved for the Special Committee, had given the names to the Standing Committee, who had taken them as so given.

The Chairman having ruled that Mr. Austin's amendment was not in order,

A Councillor suggested that, as some of the members mentioned as the Committee did not appear to be desirous of serving, the matter should be referred back to the Committee, so that they might ascertain who would serve, and appoint them.

Mr. G. Lidgett remarked that it was not at all desirable that members who were in any way interested in the Water Companies should be appointed upon the very Committee that was to inquire into the question of the water supply. It would be much better that the members should be selected by an independent Committee, such as the Standing Committee.

Lord Lingen and Mr. Brereton having both expressed a desire to be relieved from serving upon the Committee, a proposal was made, and agreed to by the Council, that the vacancies thus caused should be filled up by the Special Committee themselves.

THE LONDON COMMISSIONERS OF SEWERS AND THEIR ARTESIAN WELL.

At the Meeting of the Commissioners of Sewers last Tuesday, Mr. Malthouse put some questions with the view of eliciting information as to the progress of the artesian well which the Commissioners are sinking at Aldgate. He complained that the work was at a standstill; and he moved that the contractors be summoned before the Commissioners, He did not think the Commission should be "played the fool" with by any contractor; and he hoped no member would put a stumbling-block in the way. There was abundance of water at the place; and they could hardly work for the inflow of it. Mr. Sayer seconded the motion; remarking that he thought it time they should come to some understanding. Mr. Mathew suggested that the contractors should be summoned before one of the Committees. He moved, as an amendment, that they be summoned to attend the Streets Committee. Mr. Scott seconded the amendment. The Engineer (Mr. W. Haywood), in reply to Mr. Scott, said that with sufficient skill this work ought to have been finished long ago. The reason why it had not been done was, he supposed, the inability of the contractors to do it. Mr. Morton, in reply to Mr. Foster, said the contractors had already been before the Streets Committee. The fact was, the Commission were being played with in the matter; and they ought to put an end to the contract, and find some gentlemen who were able to carry it out. Mr. J. C. Bell said the Commission ought never to have entered into the contract. They searched all over London for the cheapest contract; and it was perfectly well known that if the men religiously carried out the work they could not do it for the sum tendered. In his opinion, the contractors never intended to carry out the work. A first-class firm would have it finished within six months. Mr. Sly agreed with Mr. Malthouse's motion, and hoped when these gentlemen were before them, the Engineer would be able to give them an account of the progress of the well since the time they had the last report. He thought they had been too lenient with the contractors. Mr. Mathew having withdrawn his amendment, Mr. Innes moved that the matter be referred to the Streets Committee, with power to terminate the contract if so advised. He thought they ought to know the terms of the contract before they acted. Mr. Bedford seconded the amendment. The Engineer said at present the depth of the well was 149 feet—the total depth required being estimated at 350 feet; but a large portion of this was simply boring. During the previous week the cylinders driven into the clay were not sufficient to keep the water out. The water had been pumped out to within 4 feet of the bottom; but there was now 30 feet of water in the well again. In the course of the last few weeks, they had been obliged to work under water. The contractors were long behind their time; and under the circumstances they ought to work night and day. Mr. Malthouse having withdrawn his motion, Mr. Innes's amendment was agreed to.

Electric Lighting in Southampton.—The quarterly meeting of the Southampton Corporation, to be held on the 8th prox., will be made special, under the Electric Lighting Acts, 1882 and 1888, for the purpose of considering an application which has been made by the Southampton Electric Light and Power Company for a License under those Acts.

Gas Exhibition and Cookery Lessons at Woolwich.—The South Metropolitan Gas Company commence this afternoon a series of free cookery lessons, with an exhibition of the most improved gas appliances for cooking, &c., in the Masonic Hall, Woolwich. The lectures will be delivered by Miss H. M. Young on the afternoons and evenings of Wednesday, Thursday, and Friday.

Improved Public Lighting at Wantage.—The improvement in the public lighting of Wantage which has lately been made by the erection at the Town Hall of one of Sugg's 150-candle "Lambeth" lamps, has just been followed by the fixing, by the Improvement Commissioners, of four lamps of the same pattern and power in the Market Square. These five new lamps replace ten ordinary 6-feet per hour lamps; so that the lighting is greatly augmented, and is altogether very effective. The work has been carried out under the supervision of Mr. F. G. Dexter, the Gas Engineer to the Commissioners; and the cost is divided equally between the Gas, Streets, and Lighting Committees.

NOTES FROM SCOTLAND.

(from our Edinburgh correspondent.)

Edinburgh, *Saturday*.

The agitation over the new rates proposed by the railway companies for the conveyance of goods, is extending in Scotland. This is not the place to discuss the merits of such a question; but its application to the gas industry may be pointed out. The first notice of the kind I have seen relating to the subject in this district, is in connection with the meeting of the Dundee Gas Commission last Wednesday, when Treasurer Nicoll called attention to the fact that, if the new rates came into operation, the Gas Commission would be affected perhaps more than any other Board in Dundee. Last year they used 35,000 tons of coal; and if 1s. per ton were added for terminal charges, this would mean an extra outlay of £1750. The other public Boards having resolved to look after this question, he suggested that a Committee from the Gas Commission should be appointed to see that their interests would not suffer. Mr. Gentle said that private individuals could certainly do their part in opposing these rates; but it was their duty as a Corporation, and having such a large interest at stake, to take steps to protect themselves. The Committee was appointed. Mr. Nicoll did not present the case fully; seeing that he did not give any idea of how the charges for conveyance would be affected. It may be taken for granted, however, that the average distance from the coal pits to Dundee will be under 50 miles—the greater quantity carried being a good deal under 50; and that consequently the charges will be considerably raised, in addition to the terminal charges. There would thus be a double grievance. Doubtless the Committee's report will present the matter in complete form. Upon the same lines as presented by Mr. Nicoll, I find that the increased charge upon the revenue of the Edinburgh and Leith Gas Commission would be more than £6000; and upon the Aberdeen Gas Corporation, above £1500. In Edinburgh, too, which lies near the coalfields, the charges for conveyance would be higher than at present—how much I cannot say; while in Aberdeen, which is, on an average, 100 miles away from its coal supply, the charges might be slightly less. Aberdeen would not, however, be so much affected directly by a rise of railway rates, as a good deal of its coal is carried by sea. There remains, however, the question of whether, in the event of the railway companies being able to command higher rates, shipowners would not follow suit, and demand higher rates of freight.

The benefits which Mr. J. M'Crae was able to secure to the Dundee Gas Commission by the introduction of improved apparatus, have already been manifest; and they are still in evidence. It is mainly on account of Mr. M'Crae's management of the undertaking that the Commission has been able to meet a large debt which accumulated, and to reduce the price of gas last summer. Working on the same lines, there is, I am glad to know, a prospect of continued prosperity. At a meeting of the Finance Committee of the Commissioners on Monday, it was reported that up to Saturday last there had been manufactured 20,000 cubic feet of gas more than at the corresponding date last year. It was also stated that an additional revenue of £3660 had been collected as compared with the same date last year. Treasurer Nicoll observed that the finances of the Commission were in an extremely satisfactory condition; and he hoped that, when the financial year closed, he would be able to recommend a further reduction in the price of gas. The gas-rental during the past eleven months amounted to £55,670.

The Dundee Water Commission have arranged to inaugurate the new duplicate Lintrathen water-main by a formal ceremony on the 1st prox.

It has been resolved to introduce a new water supply into Kingussie, which is year by year improving rapidly in popularity as a Highland resort. Many places which are held forth as attractive to tourists, on account of their scenic surroundings, are very badly supplied with water. This resolution by the Police Commissioners of Kingussie is therefore commendable, as it will remove the drawback from their locality. There is abundance of water in the district; and the new supply is to be taken from mountain springs 2000 yards from the town. The cost of the work is estimated at rather more than £1000.

(from our Glasgow correspondent.)

Glasgow, *Saturday*.

The Glasgow Corporation Gas Committee's minutes were brought up for consideration at the monthly meeting of the Town Council on Thursday; and in moving their adoption, ex-Bailie M'Laren, Convener of the Finance Sub-Committee, took occasion to refer to the increase in the gas-rental, which, up to the 27th ult., was £215,286; being £6027 in excess of the amount collected at the same time last year, notwithstanding the reduction in price. He said that, as would be observed from the minutes, they had concluded a lease of the residual products upon the sliding scale, which was a new departure. The offer which they had received was such that, he was glad to say, they expected to get as much money next year as would possibly enable them to lower the price of gas to a considerable extent.

At the ordinary monthly meeting of the Dumfries Corporation Gas Commissioners on Thursday, it was reported by the Treasurer that there was a balance of £2223 at the debit of the gas account. In the minutes of the Gas Committee, it was stated that tenders for the supply of about 5000 tons of cannel for next year had been received; and the offers were remitted to a Sub-Committee, with power to accept the most advantageous. In response to an invitation for tenders for the purchase of the tar and ammoniacal liquor to be produced at the gas-works during the year commencing the 15th prox., certain offers had been received; and the Gas Committee recommended the acceptance of Mr. W. Maxwell's, of Dumfries—his terms being 9s. per 100 gallons of tar, and 3s. 3d. per 100 gallons of ammoniacal liquor of about 5° Twaddel; the contractor to pay for the removal of the residuals from the works.

A dividend of 10 per cent. for the past year was declared at the meeting of the Lennoxtown Gas Company last Tuesday.

It is "on the cards" that the Paisley Corporation Gas Trustees have agreed to a scheme of alterations and extensions at the gas-works under their care, the cost of which is estimated at about £25,000.

Yesterday, in the Corn Exchange Sale-Room, Kilmarnock, several lots of stocks and shares were sold by public auction. Among them there were 35 £1 shares in the Kilmaurs Gaslight Company, which realized only 11s. 6d. per share. There were also 30 shares of £1 each in the Dreghorn Gaslight Company; and the price at which they were knocked down was 10s. 6d. per share. On the same occasion 15 £10 shares in the Kilmarnock Water Company were sold at £18 each.

Business was done both yesterday and on Thursday in the stocks of the Partick, Hillhead, and Maryhill Gas Company at 95s. per share. Earlier in the week they were quoted at 92s. 6d. and 94s. per share. They are firmly held for a further advance, as there is now much confidence in the position and prospects of the Company.

The Greenock Water Trustees made their annual inspection of the water-works under their charge last Monday. They were accompanied by the sugar refiners and other mill-owners on the line of conduit, who use

extensive quantities of water for power or for manufacturing purposes. In the course of the speeches which took place at the luncheon which was served on the hills among the reservoirs, some interesting statistics bearing on the water undertaking were mentioned by Provost Shankland. He stated that the water used by the sugar refiners principally cost upwards of £10,000; and that the water-mills, which actually used three-quarters of the whole supply only paid £4000. Another rate realized £2300; and the domestic rate at 9d. per £1 of rental yielded something like £6000.

The ceremony of cutting the first sod in connection with the commencement of the Falkirk and district water-supply works took place last Tuesday at the Faughlin Burn, about twelve miles from Falkirk.

Sulphate of ammonia has been in steady demand this week at about £12 per ton.

This week has been a quiet one in the Glasgow pig-iron warrant market; but it has been steady. The price of Scotch warrants has fluctuated between 44s. 8½d. and 45s. 1½d. per ton cash; the closing price yesterday afternoon being 44s. 11d. per ton. Such prices as have ruled this week have not been known for many months.

A large coal-shipping business has been reported this week; and the price of main coal has gone up to 7s. per ton, which has been paid freely. There is a good demand for house coal.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *April* 6.

Sulphate of Ammonia.—A drop of nearly £1 per ton in the quotations of nitrate has not had the effect upon the sulphate market which, from a generally accepted theory, would ordinarily have been predicted. That such a decline in the value of the greatest competitor of sulphate has had, to some extent, a demoralizing effect upon consumers, goes without saying; and nothing else could be expected. But it is equally clear from the steady maintenance of sulphate prices, that the direct influence of nitrate is at the moment considerably blunted; and that sulphate will not run down simultaneously with nitrate, for the simple reason that the super-abundance of the latter is by no means experienced in the former commodity. It may be repeated, without fear of contradiction, that sulphate remains comparatively scarce; and home consumers have only commenced to come in. But it will probably remain a hand-to-mouth business while the depression in nitrate lasts. The Continental inquiry may also be said to be somewhat better; and the speculators remain buyers as freely as before, although they are a little more hopeful perhaps of buying at the lower figures. Parcels are reported to have changed hands at £11 16s. 3d. f.o.b. Hull; although makers have almost invariably realized more, and producers seem to have parted with very little except at, or in the neighbourhood of, £12. Leith and Liverpool quotations are £11 17s. 6d. As regards nitrate, the consumption is only just commencing; and it is generally expected that the figures at the end of April will compare favourably with those of last year, and that the depression is therefore not likely to make further progress.

LONDON, *April* 6.

Tar Products.—Benzol buyers have at last come to the belief that it has touched the bottom; and there has been a good deal more activity in it. Important sales are reported at 3s. for nineties, and 2s. 2½d. for fifties. Crude carbolic continues scarce, and firm in price. The slight improvement in anthracene noted last week has not continued; and this article may be said at the moment to be "going a begging." The price is therefore nominal. Solvent naphtha is in good demand; and buyers are anxious to cover their requirements forward. Important shipments of pitch are being made; stocks are low; and, for once during the past 10 years, it may be said to be scarce. Prices: Tar, 20s. to 25s. per ton. Benzol (90 per cent.), 3s. per gallon; (50 per cent.), 2s. 2½d. per gallon. Toluol, 1s. 5d. per gallon. Solvent naphtha, 1s. 3d. per gallon. Crude naphtha (30 per cent.), 1s. 1d. per gallon. Light oil, 3½d. per gallon. Creosote, 2½d. per gallon. Pitch, 20s. to 25s. per ton, according to position. Carbolic acid (crude), 3s. 9d. per gallon. Cresylic acid, 10d. per gallon. Tar salts, 17s. per ton. Anthracene (30 per cent.), "A" quality, 1s. 4d. per unit; "B," 1s. 1d. to 1s. 2d. per unit, according to quality.

Ammonia Products.—Sulphate is selling more freely; and the large drop in the price of nitrate has not, so far, affected the price of sulphate, although it has undoubtedly caused a halt with foreign buyers. Prices: Gas liquor (5° Twaddel), 8s. per ton, with a rise or fall of 1s. 6d. per degree. Liquor ammonia, 2d. per lb. Sulphate of ammonia, £11 15s. to £12 per ton, according to position. Carbonate of ammonia, from 3d. to 4d. per lb. Muriate of ammonia, brown, £19 per ton; white, £25 per ton. Sal-ammoniac, £30 to £33 per ton.

WIMBORNE MINSTER WATER SUPPLY.—Very remarkable success has attended the boring of an artesian tube-well for the water-works of this town. In the short space of 18 days, the well has been entirely completed (130 feet deep) by the Engineers, Messrs. Le Grand and Sutcliff, of London; and a strong artesian spring has been tapped in the chalk, which rises and overflows, 2 feet above the surface, at the rate of 80,000 gallons a day. The actual computed yield by pumping is over 250,000 gallons.

ELECTRIC LIGHTING IN NORWICH.—The Norwich Town Council have accepted an estimate of Messrs. Laurence, Paris, and Scott to place electric light fittings in the Free Library for £90, and to supply light at £80 per annum. During the last ten or twelve years £55 have annually been paid for gas lighting; and on the introduction of Wenham lights, the cost went down to £30 to £40 a year. Against this, however, had to be placed the charges of a gas engineer for keeping in order the latter, which, it is asserted, has been a failure, owing to the peculiar construction of the building, and the difficulty of obtaining a through draught.

COMPLETION OF THE RICKMANSWORTH WATER-WORKS.—The Directors of the Rickmansworth and Uxbridge Valley Water Company celebrated last Saturday the completion of their works. A public visit was paid to their pumping-station; and this was followed by a luncheon at the Town Hall, Uxbridge, under the presidency of Sir H. E. Knight, the Chairman of the Company. These works have been constructed to supply eight parishes in the valley of the Colne, between Rickmansworth and Harlington. At present the population numbers upwards of 18,000. The pumping-station is at Drayton Ford, and the artesian well has been sunk to a depth of 300 feet. The surface portion consists of a brick shaft 7 feet in diameter and 25 feet in depth. An enormous flow of water has been obtained, and the level in the well can only be lowered a few feet with the utmost pumping, the overflow passing into the River Colne. A mile and a half from the pumping-station, on the summit of a hill, known as the Heronsgate, 400 feet above sea-level, is the reservoir, which is capable of storing a quarter of a million gallons of water. About seven miles of pipes have been laid at present to Rickmansworth, and there are 33 miles more of pipes to be laid to the other parishes. The water is clear and bright, with a slight blue tint. One of the recent results of this supply of water has been the formation of a Fire Brigade in Rickmansworth. The Engineer for the works was Mr. J. W. Grover, and the contractors Messrs. Aird and Sons.

THE STRIKE AT THE HALIFAX GAS-WORKS.—Last week about a score of the men formerly employed at the Halifax Gas-Works were re-engaged; and work may possibly be found for some of the others shortly. Most of the London men have returned to town. It is said that the bills for providing the new hands with food and refreshment during the strike will not fall far short of £600.

THE ELECTRIC LIGHTING EXPERIMENT AT BARNET.—At the meeting of the Barnet Local Board last Tuesday, the account sent in by the electric lighting contractor was referred back to the Finance Committee for further consideration. Complaint was made of the irregularity of the lighting, and the smallness of the allowance made for defects. It was stated that the allowance for the past three months was only 21s. 6d.

KIMBERLEY WATER-WORKS COMPANY.—The Directors of this Company, in their report to be presented to the shareholders next Wednesday, state that the accounts show a credit balance of £51,209. After paying an interim dividend of 5 per cent. and interest on debentures, writing off £12,357 (including £10,000 from construction account), and bringing forward £2913 from last account, there remains an available balance of £20,344, out of which it is proposed to pay a further dividend of 5 per cent., making 10 per cent. for the year ended Dec. 31, 1888, leaving £4594 to be carried forward.

THE PROPOSED PURCHASE OF THE KETTERING WATER-WORKS BY THE LOCAL AUTHORITY.—The shareholders of the Kettering Water Company had a meeting last week to consider the communication received by the Directors from the Kettering Local Board, expressing their desire to purchase the Company's works at a price equal to £6 10s. per share of the capital issued; the Board taking over all the assets and liabilities of the Company. A proposition was submitted against the sale; but the result of a poll was against it. As, however, the majority of votes in favour of selling (96) did not reach the three-fourths required for passing special resolutions, the works will not pass into the hands of the town.

SAN PAULO GAS COMPANY, LIMITED.—In their report of the half year ending December last, the Directors state that there is an available balance of £9199, from which they recommend a dividend at the rate of 10 per cent. per annum (free of income-tax); and after placing £3000 to renewals and contingencies account, there will remain a surplus of £1199 to be carried forward. It is also stated that the provincial authorities having again announced that the Company's contract expired in December last (instead of in 1897), the most energetic measures will be taken, if necessary, to protect the Company's privilege; but the Directors trust an amicable conclusion of the question may be shortly arrived at.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

(For STOCK MARKET INTELLIGENCE, see *ante*, p. 662.)

Issue.	Share	When ex-Dividend.	Dividend or Int. & Bonus.	NAME.	Paid per Share	Closing Prices.	Rise or Fall in Wk.	Yield upon investment.
£			p. c.	GAS COMPANIES.				£ s. d
590,000	10	12 Oct.	10½	Alliance & Dublin 10 p. c.	10	19—20	..	5 5 0
100,000	10	„	7½	Do. 7 p. c.	10	13—14	..	5 7 2
800,000	100	2 Jan.	5	Australian (Sydney) 5% Deb.	100	110—112	..	4 9 8
100,000	20	29 Nov.	10	Bahia, Limited	20	24—26	..	7 13 10
200,000	5	14 Nov.	7½	Bombay, Limited	5	6¾—7¼	..	5 8 5
40,000	5	„	7½	Do. New	4	5¼—5¾	..	5 4 2
380,000	Stck.	14 Feb.	11½	Brentford Consolidated	100	227—233	+3	5 1 8
125,000	„	„	8	Do. New	100	165—170	+1	5 2 11
220,000	20	14 Mar.	10½	Brighton & Hove, Original	20	42—44	..	4 15 5
320,000	20	28 Mar.	11½	British	20	45—47*	..	4 15 9
50,000	10	14 Mar.	11	Bromley, Ordinary 10 p. c.	10	20—22	+1	5 0 0
39,000	10	„	8	Do. 7 p. c.	10	13½—14½	+½	5 10 4
328,750	10	14 Nov.	8	Buenos Ayres (New) Limited	10	14—15	..	5 6 8
200,000	100	2 Jan.	6	Do. 6 p. c. Deb.	100	107—110	..	5 9 1
150,000	20	28 Feb.	8	Cagliari, Limited	20	25—27	..	5 18 6
550,000	Stck.	12 Oct.	15½	Commercial, Old Stock	100	272—277	+4	4 19 4
180,000	„	„	10½	Do. New do.	100	417—422	+2	4 16 10
180,000	„	28 Dec.	4½	Do. 4½ p. c. Deb. do.	100	123—128	..	3 10 3
557,320	20	13 Dec.	13	Continental Union, Limited	20	47—49	..	5 6 2
242,680	20	„	13	Do. New '69 & '72	14	32—33	..	5 10 3
200,000	20	„	10	Do. 7 p. c. Pref.	20	38—40	..	5 0 0
75,000	Stck.	28 Mar.	10	Crystal Palace District	100	204—208*	..	4 16 2
234,060	10	30 Jan.	13	European, Limited	10	25½—26½	..	4 18 1
120,000	10	„	13	Do. New.	7½	17—18	..	5 8 7
364,060	10	„	13	Do. do.	5	12—13	..	5 0 0
5,468,500	Stck.	14 Feb.	13	Gaslight & Coke, A, Ordinary	100	261—263	+4	4 17 9
100,000	„	„	4	Do. B, 4 p. c. max.	100	100—105	+1	3 16 3
665,000	„	„	10	Do. C, D, & E, 10 p.c. Pf.	100	260—265	..	3 15 6
80,000	„	„	5	Do. F, 5 p. c. Prf.	100	123—128	..	3 18 1
60,000	„	„	7½	Do. G, 7½ p. c. do.	100	180—185	..	4 1 1
1,300,000	„	„	7	Do. H, 7 p. c. max.	100	170—175	..	4 0 0
463,000	„	„	10	Do. J, 10 p. c. Prf.	100	258—263	..	3 16 1
1,031,150	„	13 Dec.	4	Do. 4 p. c. Deb. Stk.	100	120—123	..	3 5 0
294,350	„	„	4½	Do. 4½ p. c. do.	100	125—130	..	3 9 3
650,000	„	„	6	Do. 6 p. c. do.	100	174—179	..	3 7 0
8,600,000	Stck.	14 Nov.	10	Imperial Continental	100	210—213	..	4 18 10
75,000	5	13 Dec.	6	Malta & Mediterranean, Ltd	5	5—5½	..	5 9 1
560,000	100	1 Apr.	5	Met. of Melbourne, 5 p.c. Deb.	100	113—115*	+½	4 6 11
541,920	20	29 Nov.	6	Monte Video, Limited	20	18½—19½	..	6 3 1
150,000	5	29 Nov.	10	Oriental, Limited	5	9¼—9¾	..	5 2 7
60,000	5	28 Mar.	7	Ottoman, Limited	5	6¼—6¾*	..	5 3 8
166,870	10	16 Jan.	4	Pará, Limited	10	5½—6	..	6 13 4
				People's Gas of Chicago—				
420,000	100	2 Nov.	6	1st Mtg. Bds.	100	104—107	..	5 12 1
500,000	100	1 Dec.	6	2nd Do.	100	95—100	..	6 0 0
100,000	10	12 Oct.	10	San Paulo, Limited	10	16½—17½	..	5 14 4
500,000	Stck.	28 Feb.	16½	South Metropolitan, A Stock	100	314—319	..	5 1 11
1,350,000	„	„	12½	Do. B do.	100	241—246	+1	4 18 7
141,500	„	„	13½	Do. C do.	100	255—265	..	5 0 0
600,000	„	28 Dec.	5	Do. 5 p. c. Deb. Stk.	100	137—140	..	3 11 5
60,000	5	28 Feb.	11½	Tottenham & Edm'ntn, Orig.	5	11—13	..	4 8 5
				WATER COMPANIES.				
717,467	Stck.	28 Dec.	9	Chelsea, Ordinary	100	257—262	..	3 8 8
1,720,560	Stck.	12 Oct.	7½†	East London, Ordinary	100	209—213	−1	3 10 5
700,000	50	13 Dec.	9	Grand Junction.	50	122—126	..	3 11 5
708,000	Stck.	14 Feb.	10½	Kent	100	272—277	..	3 15 9
1,043,800	100	28 Dec.	9	Lambeth, 10 p. c. max.	100	253—257	..	3 10 0
406,200	100	„	7½	Do. 7½ p. c. max.	100	199—204	..	3 13 6
200,000	Stck.	28 Mar.	4	Do. 4 p. c. Deb. Stk.	100	118-120*	..	3 6 8
500,000	100	14 Feb.	12½	New River, New Shares	100	350—355	..	3 8 4
1,000,000	Stck.	30 Jan.	4	Do. 4 p. c. Deb. Stk.	100	125—128	..	3 2 6
902,300	Stck.	13 Dec.	6	S'thwk & V'xhall, 10 p.c. max.	100	170—175	..	3 8 6
126,800	100	„	6	Do. 7½ p. c. do.	100	160—165	..	3 12 9
1,155,066	Stck.	„	10	West Middlesex	100	264—269	..	3 14 4

*Ex div

†Next dividend will be at this rate.

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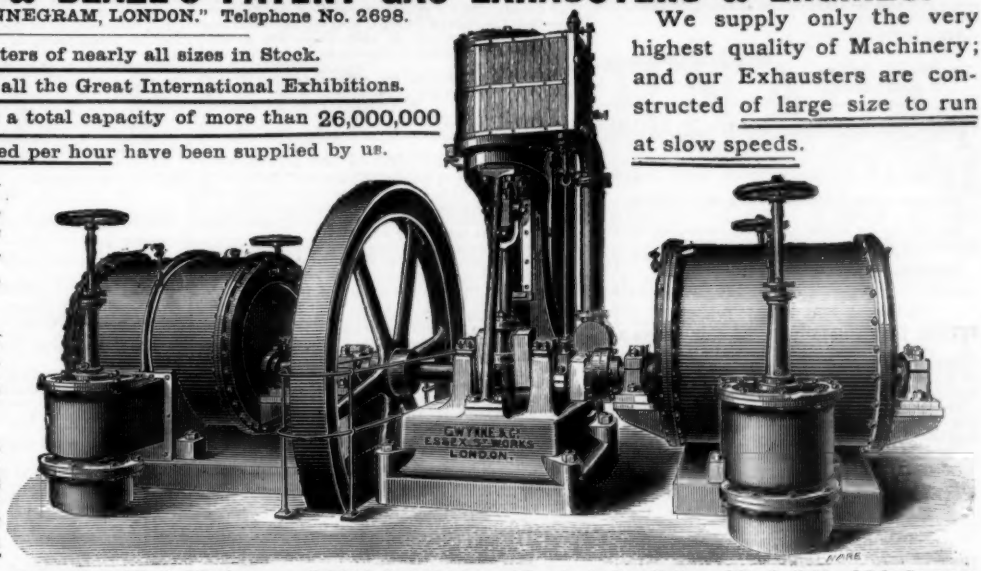

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Premium required.

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*** See Advertisement on Page III. of the Wrapper of this week's issue.

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Contractors for Gas-Works complete, Makers of Gasholders, Purifiers, Scrubbers, Condensers, Retort Fittings, &c., Improved Valves, Engines, and Exhausters. Also for Collingwood's Regenerative Retort-Settings.

*** See Advertisement p. 604 of last week's issue.

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Tenders for the purchase of the same to be addressed to the Chairman of the Gas Committee.

By order,
GEORGE DUNBAR MALAM,
Engineer.

Bingley, March 19, 1889.

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FOR SALE—Three Boiler-Tanks in first-class condition; sizes about
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26 „ 0 „ by 9 „
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W. W. HULSE,
Secretary and Manager.
Gas-Works, Longton, Staffordshire,
April 6, 1889.

REDHILL GAS COMPANY.

SALE OF SHARES.

MESSRS. MOULTON, FISK, and WALKER are instructed to Sell by Auction, at the White Hart Hotel, Reigate, on Tuesday, the 16th of April, 1889, at Five for Six o'clock in the evening,
27 FULLY-PAID and 16 HALF-PAID SHARES in the REDHILL GAS COMPANY.

The Company pay good Dividends; and these Shares are offered as a desirable investment for small amounts.

Particulars and Conditions of Sale may be had at the place of Sale; of Mr. ALINGHAM, Printer, Market Place, REIGATE; Mr. S. SHELDRAKE, Warren Road, REIGATE; F. J. W. WOOD, Esq., Solicitor, Ipswich, SUFFOLK; and of the AUCTIONEERS, Woodbridge, SUFFOLK.

FOR SALE—By the Clayton, Allerton, and Thornton Gas Company, Two 12-inch ANDERSON'S PATENT CONCENTRIC STATION GOVERNORS, in good working condition. Being taken out to replace them with larger Governors. One is taken out, and the other will be at liberty in June. No reasonable offer refused.

Apply to the undersigned.

JOHN NIVEN,
Engineer and Manager.

Clayton, near Bradford,
April 3, 1889.

THE Ballymena and Harryville Gaslight Company, Limited, invite TENDERS for 1300 tons BEST SCREENED GAS COAL, f.o.r. at Larne or Belfast, to be delivered before the 1st of November next.

Payment to be made on the first Monday in March, 1890.

Tenders to be lodged with me on or before Ten o'clock, on Monday, the 15th of April next.

GEORGE GREENE, Secretary.

Ballymena, March 25, 1889.

TENDERS FOR TAR AND LIQUOR.

THE Gas Committee of the Colne and Marsden Local Board are prepared to receive TENDERS for the surplus TAR and LIQUOR made at their Works for either One or Two years, commencing from April 1, 1889, to March 25, 1890.

Tenders to be addressed to the Chairman of the Gas Committee, Colne, Lancashire, on or before April 20, 1889.

The Committee do not bind themselves to accept the highest or any tender.

THOMAS VARLEY.

Gas-Works, Colne, Lancashire,
March 28, 1889.

BOROUGH OF MACCLESFIELD.

THE Gas Committee are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Works during the Twelve months or Two years commencing the 1st day of May next.

Tenders, for both One or Two years, to be sent in not later than Saturday, the 27th of April, 1889, addressed to the Chairman of the Gas Committee, Town Hall, Macclesfield, and endorsed "Tender for Tar, &c."

For conditions apply to Mr. Moore, Engineer, Gas-Works, Macclesfield.

W. FREDK. TAYLOR, Town Clerk.

Macclesfield, March 25, 1889.

TENDERS FOR COALS.

THE Derby Gaslight and Coke Company are prepared to receive TENDERS for the supply of 36,000 tons of screened SOFT COALS and SOFT COBBLES or NUTS, to be divided into Four Contracts of 9000 tons each; and to be delivered guaranteed weight 21 cwt. to the ton.

Sealed tenders (to be made on forms obtainable at the Company's Office), specifying the description of Coals and the Pits at which they are to be raised, stating the quantities and prices delivered at the Midland or Great Northern Railway Stations, or at the Gas Company's Siding, Midland Railway, London Road—if sent by Canal to be delivered at some Wharf in the Borough of Derby, or at the Gas Company's Wharf, London Road—in manner and subject to the conditions to be made, must be delivered at the Offices of the Company, Friar Gate, on or before Tuesday, the 23rd day of April inst.

By order of the Directors,

RICHARD FISHER, Secretary.

Derby Gas Office, April 3, 1889.

ROMFORD GAS AND COKE COMPANY, LIMITED.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Romford Gas and Coke Company, Limited, are prepared to receive separate TENDERS for the purchase of the AMMONIACAL LIQUOR and surplus TAR produced at their Works for One, Two, or Three years from the 1st of May next.

The tenders for the Liquor to state the price per ounce Twaddel per butt of 108 gallons; and the price per gallon for the Tar

Both Tar and Liquor will be pumped by the Company into the Contractor's Tank-Vans at the Works or into the Contractor's Tank-Trucks at Romford Station, Great Eastern Railway.

The Directors do not bind themselves to accept the lowest or any tender.

Tenders to be sent to the undersigned on or before the 20th inst., endorsed "Tender for Tar and Liquor."

By order,

W. G. WILSHAW, Secretary.

Romford, April 6, 1889.

TENDERS FOR GAS COALS.

THE Directors of the Petworth Coal Gas and Coke Company are open to receive TENDERS for the supply of 800 tons of EAST PONTOP, PELAW MAIN, WALLSEND, or other GAS COAL of equal quality, the same to be delivered into the Company's Works, put under Cover and Stacked and Trimmed, at such times and in such quantities, within Twelve months, as may be directed by the Secretary.

Tenders, addressed to the undersigned, to be sent on or before the 1st day of May, 1889.

WALTER BUCKMAN, Secretary.

Petworth, April 2, 1889.

THE Gas Committee of the Leeds Corporation are prepared to receive TENDERS for the AMMONIACAL LIQUOR that may be produced at their Gas-Works, York Street, Meadow Lane, and New Wortley, during a period of One, Two, or Three years, from the 1st of July next.

The quantity annually produced is approximately about One million gallons at York Street Works, about 2½ million gallons at Meadow Lane Works, and about 3 million gallons at New Wortley Works.

Tenders may be for the Liquor produced at any one of the Works, or for the whole.

Forms of tender and conditions of contract may be obtained on application to Mr. Lupton, Gas Department, Municipal Offices, Leeds, and endorsed Tenders, addressed to the Chairman of the Gas Committee, at the same Address, will be received not later than Thursday, the 9th day of May next.

The Committee do not bind themselves to accept the highest or any tender.

HARTLEPOOL GAS AND WATER COMPANY.

THE Directors of the Hartlepool Gas and Water Company are prepared to receive TENDERS for the Supply and Erection at their Works, West Hartlepool, of Two PURIFIERS, 23 feet by 16 feet, and 4 feet deep, with all necessary Valves, Connections, Girders, and Columns to support same.

Plans and specifications may be seen, copies of same obtained, with any further information, upon application to the Company's Engineer, Mr. Thomas Bower.

Tenders, sealed and endorsed "Tender for Purifiers," to be sent to the undersigned not later than Wednesday, the 10th day of April next.

The Directors do not bind themselves to accept the lowest or any tender.

THOMAS TREWHITT, Secretary.

Gas-Works, West Hartlepool,
March 26, 1889.

BOROUGH OF HEYWOOD.

TO COLLIERY PROPRIETORS.

THE Gas Committee of the Heywood Corporation are prepared to receive TENDERS (from Colliery Proprietors only) for the supply of 8000 to 10,000 tons of BEST SCREENED GAS COAL, to be delivered at Broadfield Railway Station, Heywood.

The deliveries are to be made in such quantities, and at such times, as the Gas Engineer may direct.

Full particulars and tender form can be had on application to the Engineer, Mr. H. Hawkins.

Sealed tenders, endorsed "Tender for Coal," are to be delivered at the Town Clerk's Office, addressed to the Chairman of the Gas Committee, on or before Monday, the 15th day of April, 1889.

The Committee do not bind themselves to accept the lowest or any tender; but reserve the right to accept a portion of any tender.

By order,

A. WALLIS, Town Clerk.

April 1, 1889.

MILFORD IMPROVEMENT ACT, 1857.

CONTRACT FOR NEW GAS-WORKS.

THE Milford Improvement Commissioners (Milford Haven) invite TENDERS for the supplying and fixing of all the necessary GAS-MAKING APPARATUS for their proposed New Gas-Works at Milford Haven (capacity, daily make 50,000 cubic feet).

Plans may be seen at the Commissioners' Offices, Charles Street, Milford Haven.

Printed specification and form of tender may be had for seven shillings and sixpence, on application to the undersigned, from whom full information may be obtained.

The Improvement Commissioners do not bind themselves to accept the lowest or any tender.

Tenders, endorsed "Contract No. 2," addressed to the Chairman of the Improvement Commissioners, Milford Haven, must be sent in on or before the 1st day of May next.

PEREGRINE THOMAS,
Clerk to the Milford Improvement Commissioners.

Milford Haven, April 5, 1889.

BOROUGH OF STOCKPORT.

RESIDUAL PRODUCTS FOR SALE.

THE Gas Committee of the Corporation are prepared to receive TENDERS for the purchase of the TAR and AMMONIACAL LIQUOR produced at their Works for a period of One, Two, or Three years, commencing on the 1st of July next.

The tenders to state the price per ton for tar and the price per ton for liquor, 6° Twaddel.

Tenders to be delivered, addressed to the Chairman, on or before Tuesday, the 16th of April, endorsed "Tender for Tar, &c."

Particulars as to quantity and conditions of contract may be obtained on application to the Engineer.

The Committee do not bind themselves to accept the highest or any tender.

JAMES JACQUES,
Engineer and Manager.

Gas-Works, Stockport, April 5, 1889.

CORPORATION OF STOCKPORT.

THE Gas Committee are prepared to receive TENDERS for a supply of CANNEL and GAS COAL NUTS, to extend over a period of One, Two, or Three years—delivery to be made at the Railway Station or the Works, as may be required, commencing July 1, 1889.

Tenders to be delivered on or before the 16th of April, endorsed "Tender for Cannel or Nuts," and addressed to the Chairman of the Gas Committee.

The Committee do not bind themselves to accept the lowest or any tender.

No form of tender but that issued by the Committee will be accepted.

Full particulars as to quantities and other information may be obtained on application to the undersigned.

JAMES JACQUES,
Engineer and Manager.

Gas-Works, Stockport, April 5, 1889.

BOROUGH OF SALFORD.

(GAS DEPARTMENT.)

THE Gas Committee of the Salford Corporation are prepared to receive TENDERS for the supply of FIRE-CLAY GOODS (Retorts, Tiles, Bricks, &c.) required for their Gas-Works during the next Twelve months.

Particulars and quantities may be obtained on application to the Engineer and Manager, Gas Offices, Bloom Street, Salford.

Tenders, endorsed "Tender for Fire-Clay Goods," addressed to the Chairman of the Gas Committee, must be delivered to me at the Town Hall, Salford, at or before Three p.m. on Thursday, the 11th of April next.

By order,

SAMUEL BROWN, Town Clerk.

Town Hall, Salford, March 25, 1889.

CARDIFF GASLIGHT AND COKE COMPANY.

TENDERS FOR COALS.

THE Directors of the above Company are prepared to receive TENDERS for a supply of 50,000 tons of best DOUBLE-SCREENED LARGE GAS COALS, the deliveries to commence in July next, for a period of One year, and to be supplied in monthly quantities in accordance with the Specification.

A quantity of about 8000 tons will be required at the Bute Terrace Works, and about 42,000 tons at the Grangetown Works, Cardiff.

Parties tendering can do so for the whole quantity, or for quantities from 5000 tons upwards.

The Company's Grangetown Works are in direct communication with all Railway Companies and with the Penarth Docks, and well situated for receiving cargoes of Coal by steamers.

Deliveries, if by steamer, to be free into trucks at Penarth Docks, and if by rail, free into the Works at Grangetown; those for the Bute Terrace Works to be delivered at the Cardiff Station of the Great Western, Taff Vale, or Rhymney Railway.

Specification of monthly deliveries, conditions of discharging, and all other information required, can be obtained on application to Mr. H. Morley, the Company's Engineer.

The tenders must state the name and locality of the Colliery, also the particular seam from which it is proposed to supply the coal, and the price, delivered as above, accompanied if possible with a practical working analysis.

Sealed tenders to be sent to the undersigned not later than Wednesday, the 1st of May next, addressed to the Chairman of the Company, endorsed "Tender for Coal."

The Directors do not bind themselves to accept the lowest or any tender, and reserve to themselves the right to apportion the whole quantity as they may think fit.

By order,

GEORGE CLARRY, Secretary.

Gas Offices, Cardiff, March 30, 1889.

SIXTH YEAR. Now Ready (Demy 8vo., Price 5s., or 5s. 6d. post free),

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OF THE VARIOUS

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FORMING A COMPANION VOLUME TO THE TRANSACTIONS OF THE GAS INSTITUTE, WITH WHICH IT IS UNIFORM IN SIZE.

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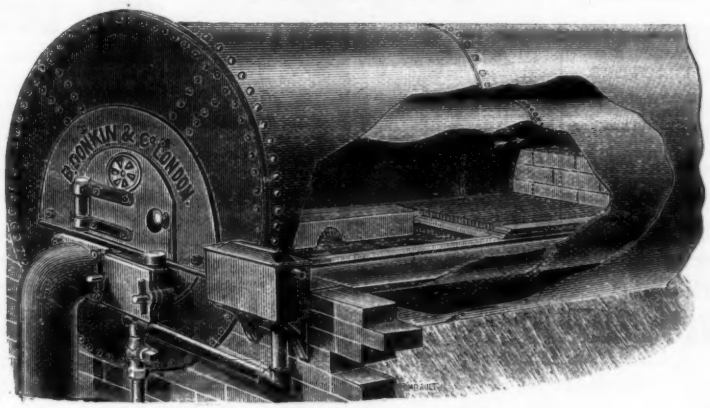
About **600** in successful operation in England and abroad. Over **150** have been put into boilers in the last **two years** in England alone. Important to all Users of Steam Power for raising steam from Coal, Anthracite, or Coke **Dust,** Breeze, Refuse, **Ashes,** or any kind of Small Fuel that can be obtained cheaply.

OVER ONE HUNDRED IN



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Dust Coal on this Furnace will raise within 5 per Cent. of the same quantity of steam as an equal weight of large coal (of the same quality) on an ordinary furnace.

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Over **6 lbs.** of water per square foot of **heating surface** of boiler per hour has been easily evaporated by these Furnaces; and, being forced blast, no chimney is required to do this.

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As much as **11 lbs.** of water per pound of **Coal Dust** has been evaporated by the use of this Furnace in an ordinary Cornish Boiler, and over **7 lbs.** of water per pound of **Coke Dust.**

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In many cases fuel is now used which was formerly valueless; thereby **saving the whole of the fuel bill,** and returning the first cost of the Furnaces in a very short time. Many firms, having tried them for some months, have repeated their orders; one Company having placed at intervals **10 separate orders** with us, and have now 32 Furnaces at work.

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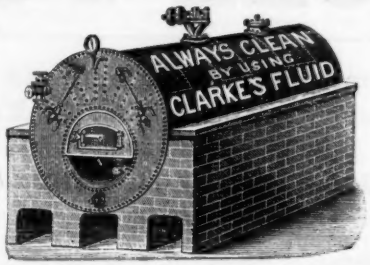

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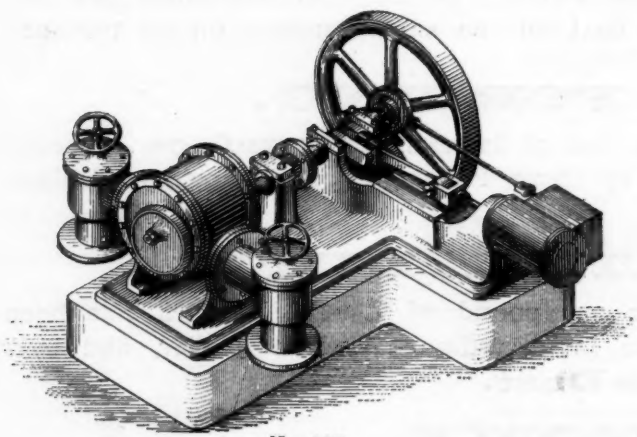

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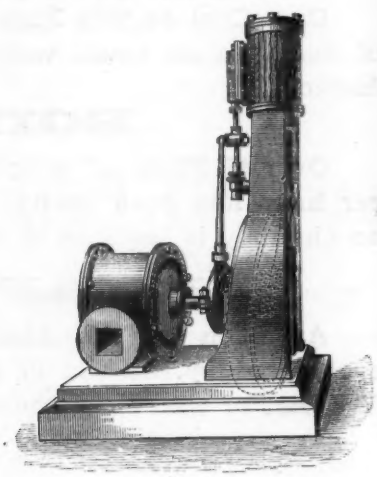

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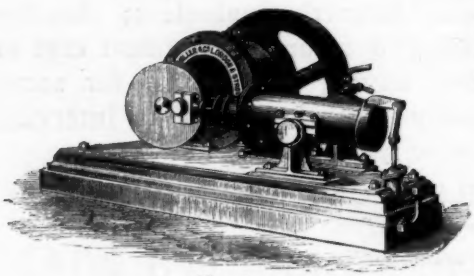

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MANUFACTURERS OF WROUGHT-IRON TUBES AND FITTINGS, BRASS GAS-FITTINGS, GAS-VALVES, STEAM AND WATER VALVES, &c.,

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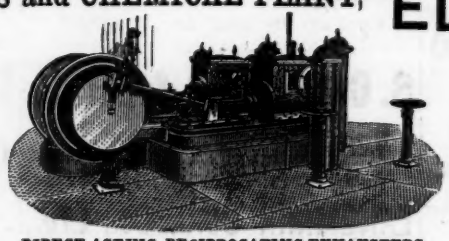

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MOST EFFECTIVELY AND *ECONOMICALLY RESTORES* LIME WASTES CONTINUOUSLY.

The Patentee having under his several Patents effected a complete solution of the Spent Lime difficulty, most confidently solicits the consideration of the fact by the Engineers and Managers of Gas Companies, Gas Corporations, and other SpentLime producers. The adoption of these Patents secures the following amongst other advantages, viz.:—1st. Nuisance is avoided, and the utmost convenience and comfort in Gas purification are secured. 2nd. The Lime is recovered at from one-third to one-half the cost of new Lime, or from 5s. 6d. to 7s. 6d. per Ton (depending on extent of works and working charges). 3rd. The Lime is either recovered for Building and Agricultural purposes, or specially and continuously for Gas purification—no limit being assigned to its durability. 4th. Nearly the whole of the valuable sulphur is collected and sold. 5th. By the Patentee's Improved Furnace, breeze or inferior cannel coke only is required as a fuel. The process has been worked for a considerable time by several important Gas Companies and Corporations throughout the Kingdom, and with the most satisfactory results. The Patentee erects, proves, and grants working on very moderate terms.

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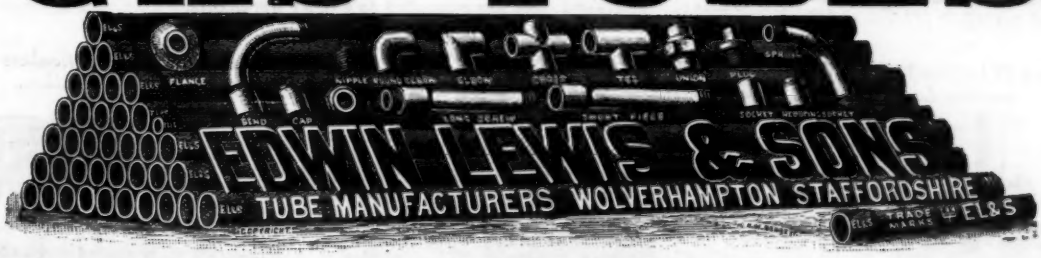

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All kegs are labelled as above.

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ASBESTOLINE is the most efficient Lubricant for all bearings.
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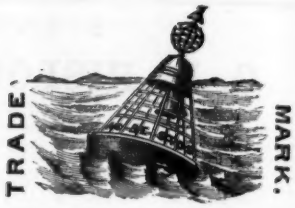

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ASBESTOLINE, to meet all circumstances, is made in four degrees of consistency—A, B, C, and CC.

ASBESTOLINE, A, is specially adapted to ordinary Land Engines and Machinery, in and out door, in this country.

ASBESTOLINE, B, a little more solid, is for use on Steamships in temperate climates, also on land when it is desirable to have Lubricant stiffer than A.

ASBESTOLINE, C, is for use in tropical climates, both ashore and afloat. It is also invaluable in works in this country when the temperature is high.

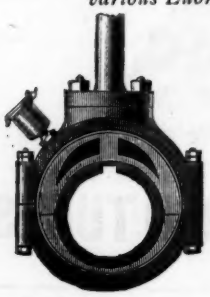
ASBESTOLINE, CC, is designed for use on Calenders, Paper-Machines, &c., where the bearings are heated by steam passing through, and sometimes is advantageously used instead of C.

The reputation of Asbestoline as a Lubricant of the highest efficiency in every kind of Machinery is established; and it has never been equalled by any other Lubricant in the numerous cases of special difficulty in which the best oils are ineffectual. It is used with marked success in Steel and Iron Works, Collieries, Cotton and Wool Mills, and other Textile Manufactories. In Corn-Mills it has proved invaluable on the roller and other modern machines. In Saw-Mills, on machines going up to 5000 revolutions per minute, its work has never been approached by any other Lubricant On Electric Lighting Machinery, and in Steamships of all sizes throughout the world, the success of Asbestoline is unequalled. Many engines and machines of all descriptions give trouble, and show bad results both in working and wear, when the system of lubrication has not received due consideration. Engineering firms of the highest standing have given to it their powerful testimony and support.

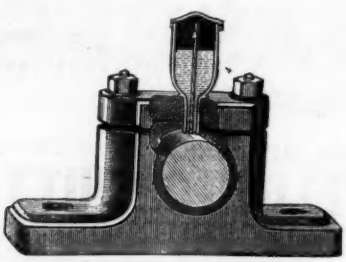
Supplied in Kegs, 28, 56, or 112 lb. Price, 2/3 per lb. Kegs Free. Special Terms for Large Quantities.

IMPORTANT TO EXPORT MERCHANTS.—*One pound of "Asbestoline" equals 2 gallons of Oil weighing 18lbs.; consequently the saving in freight is very considerable. Liberal Terms are conceded to Export Merchants.*

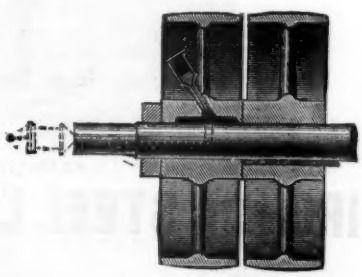
Below will be found illustrations of the mode of fixing Lubricators for Asbestoline to bearings. Full particulars of the various Lubricators supplied for Asbestoline, and the manner of fitting, in catalogue free on application.



Lubricator fitted to Eccentric of Vertical Engine



Showing Section of Lubricator fitted to ordinary Bearings.



Lubricator in different position for Loose Pulleys.

THE ATTENTION OF

ENGINEERS, AND ALL USERS OF STEAM POWER AND MACHINERY,

IS SPECIALLY INVITED TO THE FOLLOWING REPORT.

Owing to the number of Greases now offered, samples of Bell's Asbestoline were submitted to Otto Hehner, Esq., for analysis, and the subjoined Report fully proves Bell's Asbestoline to be the safest as well as the best Lubricant for all purposes:—

The Laboratory, 11, *Billiter Square, E.C., London, May* 3, 1888.

I have subjected a sample of Bell's Asbestoline taken from the stores of Messrs. J. Bell and Son, in Southwark Street, to a number of tests, in order to ascertain whether its use in Mills or Factories might contribute to the danger from Fire.

I found that Asbestoline **ignites only with the greatest difficulty** when brought into contact with flame; that wood and other combustible material soaked in Asbestoline burns, if anything, with greater difficulty than by itself; that its **flashing point** is so high that it **lies beyond the range of Mercurial Thermometers**; and that consequently no friction obtainable in the ordinary run of machinery is capable of developing inflammable vapours from it.

Bell's Asbestoline is **as absolutely safe a Lubricant as can be desired or obtainable.** In the case of fire breaking out from any cause, it does not assist the conflagration; and it is **quite incapable of leading to spontaneous combustion,** either by itself or in contact with inflammable material.

From the physical nature of Asbestoline its use is of necessity perfectly clean and free from waste.

(Signed) OTTO HEHNER, Public Analyst.

Illustrated Priced Catalogue, with numerous Testimonials by Leading Firms, free on application.

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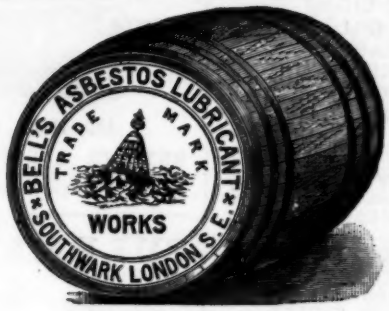
(REGISTERED.)

All Drums marked as above.



Every Cask is sent out as above.

All Corks are sealed as above.

Any Customer receiving Oil sold as **Bell's Asbestos Lubricant**, and Cask, Drum or Corks not marked as above, is earnestly requested to forward us sample and particulars of where obtained.

The following Oils, refined and prepared by our Asbestos process, are specially recommended to Users of Machinery of every kind in all parts of the world. We guarantee the quality of each to be unequalled at the price for the purpose named, and a Sample Drum, containing 5 gallons of each or any sort, will be sent on approval to any respectable firm in any part of the world :—

BELL'S SPECIAL GAS-ENGINE OIL.—This oil is guaranteed to stand flame temperature, and is suitable for light Machinery and Shafting where gas power is used.
Price **2s. 9d.** per gallon.

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For other Qualities and Prices, with Testimonials, see Catalogue, free on application.

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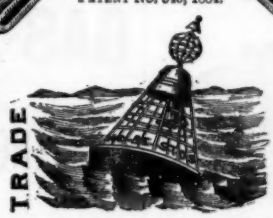
The above, which can only be obtained from this house, is recognized as the Most Efficient and Economical Jointing Material in use. It is composed of a specially prepared India-rubber Compound, protected by a covering of Vulcanized Asbestos Sheeting, as shown above, and as it is the only Jointing Material which adequately combines PERMANENT ELASTICITY WITH HEAT RESISTANCE, the advantage it possesses will at once be seen.

SECTION OF SHEETING.
PATENT No. 640, 1884.



BELL'S ASBESTOS.

EXPANSION RINGS.

The centre from which the requisite elasticity is obtained will adapt itself to uneven surfaces to which it may be applied, and allow expansion and contraction to be fully taken up. The covering, being of Asbestos Cloth, imparts a protection to the centre, and so prolongs its elasticity. For Manhole, Mudhole, Steam-Pipe, and Mash-Tun Door Joints it is unequalled; and if applied as directed, a ring can be used many times over.

Price 6s. per lb. in Sheets. Rings made up to Template, 9s. per lb.

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MOST INTENSE WHITE BRILLIANT GAS LIGHT.
MOST ECONOMICAL, SIMPLE, AND DURABLE.
DOES NOT GET OUT OF ORDER.
RIVALS THE ELECTRIC LIGHT.
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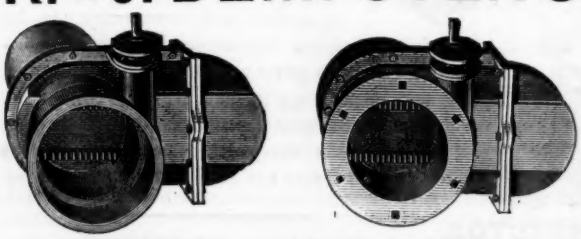

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NEW IMPROVEMENTS

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Under pressure, effecting a considerable Saving in Time in Working off the Contents of each Still.

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Being the Highest Honour given for this Class.

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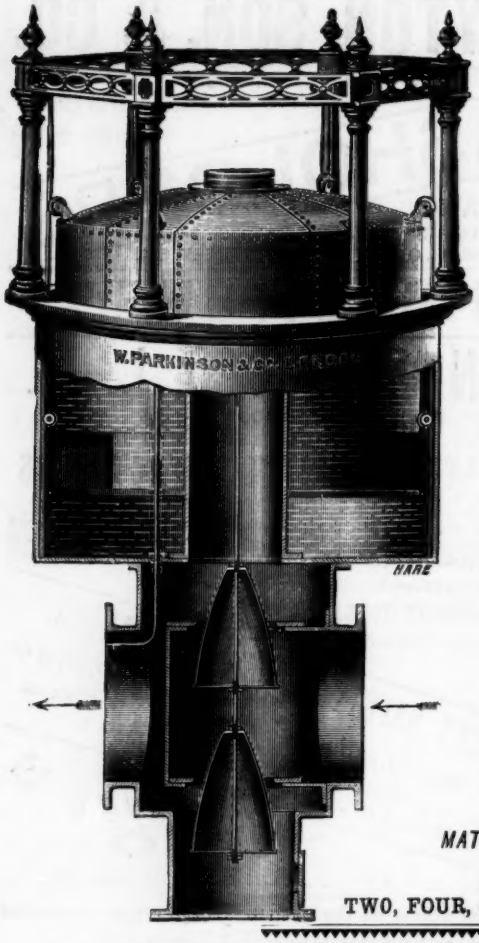

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This Governor combines all the advantages of simplicity with perfect efficiency. It effectually overcomes the difficulty of varying pressures experienced by many Engineers owing to the change of light and heavy gasholders, and their causes.

Two parabolic cone valves are employed, one fitted above the other, as shown in the Engraving. By this means the flow of gas is divided, and passes equally through the valves, which are in perfect equilibrium, whatever position they occupy.

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TWO, FOUR, or SIX COLUMNS and GIRDERS.—WEIGHTS or WATER PRESSURE.

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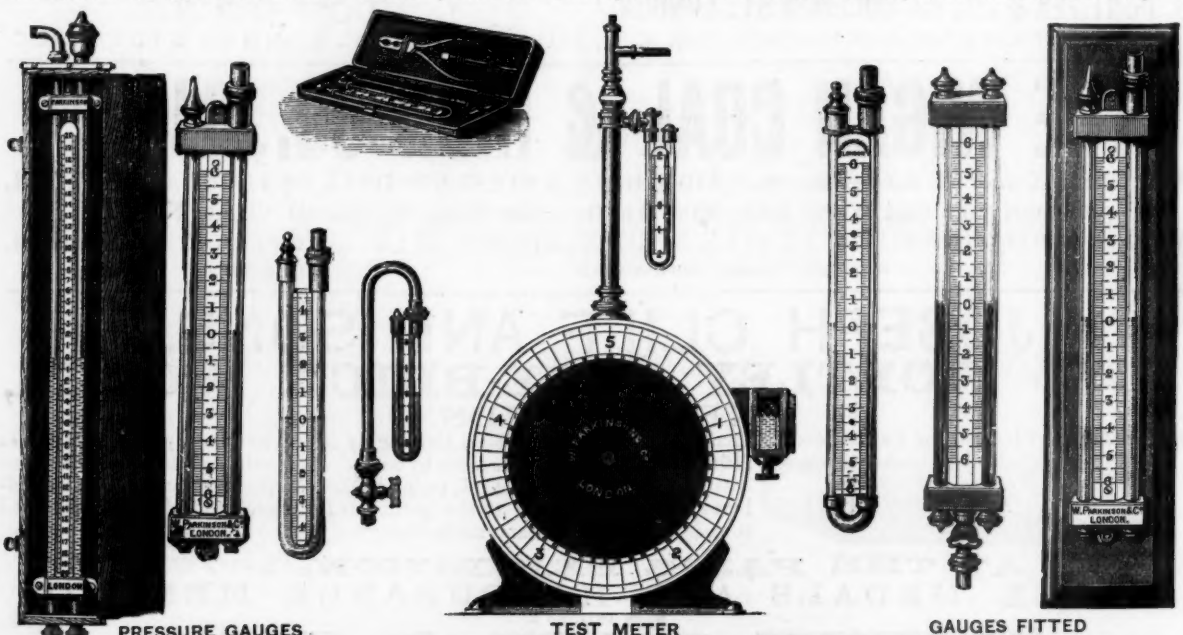

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GOLD & SILVER MEDALS, Health Exhibition, London, 1884. SILVER MEDAL, Inventions Exhibition, 1885.

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[See also Advt., p. 656.

London: Printed by WALTER KING (at the office of King, Sell, and Railton, Ltd., 12, Gough Square); and published by him at No. 11, Bolt Court, Fleet Street in the City of London.—Tuesday, April 9, 1889.